RELATIONSHIPS AMONG THE PHYSICAL EDUCATION CLIMATE AND PHYSICAL ACTIVITY IN JUNIOR HIGH SCHOOL PHYSICAL EDUCATION: A MEDIATIONAL ANALYSIS

by

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ABSTRACT

Physical activity rates are declining and many adolescents lack adequate motivation for active participation in physical education. The physical education climate refers to goals and values perceived to be endorsed in achievement settings and may be integral to understanding motivation in physical education. Recent achievement goal extensions have examined the teacher's emphasis on mastery, performance-approach, performance-avoidance, and social approval goals as relevant to student motivation. Also, researchers examined the influence of a caring climate in relation to physical activity. Self-efficacy and intrinsic motivation have also been shown to be strong predictors of physical activity. To further understand motivation for active participation in physical education, the purpose of this study was to determine whether self-efficacy and intrinsic motivation mediate the relationship between adolescents' perceptions of their physical education climate and their subsequent physical activity. This study utilized a prospective study design. Participants included 275 mostly Caucasian students (138 males, 137 females; *M* age = 13.32) enrolled in six physical education classes at two junior high schools with a total of four physical educators. Participants completed a multisection inventory, consisting of the Perceptions of Teachers' Emphasis on Goals Questionnaire (PTEGQ), the Caring Climate Scale (CCS), a 6-item questionnaire measuring self-efficacy, the Intrinsic Motivation (IMI), and pedometers were utilized to

assess physical activity. Cronbach's alpha coefficients of all measures ranged from .74 to .95 indicating the measures were internally reliable. Mediational analyses indicated that self-efficacy and intrinsic motivation did not mediate the relationship between the physical education climate and physical activity. Path analysis indicated an inadequate fit for the proposed model. Multiple regression analyses revealed a performance-avoidance climate was negatively related to self-efficacy and intrinsic motivation, (β = -.16 and -.18, respectively). Social approval climate positively (β = .18) and perceptions of a caring climate negatively (β = -.18) predicted physical activity. Lastly, self-efficacy and intrinsic motivation both positively predicted physical activity (β = .32 and .38, respectively). The results were limited to junior high school physical education students that included numerous measurement issues. The overall conclusions suggest that high levels of self-efficacy and intrinsic motivation optimize physical activity directly rather than as mediators.

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CHAPTER 1

INTRODUCTION

It is widely believed among researchers that regular physical activity during adolescence is associated with health and well-being (Fein, Plotnikoff, Wild, & Spence, 2004; Gauvin & Spence, 1996; U.S. Department of Health and Human Services [USDHHS], 1996). The Centers of Disease Control and Prevention (CDC, 2008) found that positive experiences with physical activity at a young age help lay the basis for being regularly active throughout early and later adulthood. Physical education and other school programs have the potential to promote public health by facilitating positive experiences and healthy attitudes towards physical activity (Sallis & McKenzie, 1991; Wallhead & Buckworth, 2004). Recent research, however, suggests that many children lack proper motivation for active participation in physical education and sport programs (Mitchell, 1996; Papaioannou, 1997; Van Wersch, Trew, & Turner, 1992). In 2005, only 36% of high school students had participated in the nationally recommended level of at least 60 minutes of physical activity per day on 5 or more of the previous 7 days, and only 33% attended physical education class daily (Division of Nutrition, Physical Activity and Obesity, 2008; National Center for Chronic Disease Prevention and Health Promotion, 2008). Because physical activity is critical for overall health in adolescence and reduces

the prevalence of health problems in later adulthood (e.g., obesity and diabetes), further research is needed to better understand how to promote increased participation among adolescents in physical education settings.

Many studies have examined correlates of physical activity behavior among adolescents in sport and physical education settings in an attempt to identify variables that explain and/or predict physical activity behavior (Gao, Lee, Kosma, & Solmon, 2007; Morgan, Graser, & Pangrazzi, 2008; Ntoumanis & Biddle, 1999; Roberts, Treasure, & Conroy, 2007; Trost, Pate, Ward, Saunders, & Riner, 1999). Identifying variables that are predictive of physical activity behavior can be facilitated by adopting a social cognitive approach due to its prominence in the past 3 decades studying the dynamic process of human motivation in the physical domain.

Social Cognitive Approach

The social cognitive approach assumes humans are actively deciding and planning the attainment of a personally or socially valued achievement behavior (Roberts et al., 2007). There are several theories within this approach that claim to describe and/or explain motivated behavior. Three theories that have emerged in the forefront of motivation research in the physical domain include: achievement goal theory, self-efficacy theory, and self-determination theory. Each theory has shed light on the motivational correlates of physical activity but no one motivation theory has emerged as the single best theory to understand the dynamics of motivation in physical activity settings. Recently researchers have begun to integrate and synthesize the three theories to

more thoroughly understand and explain the antecedents of physical activity behavior (Cury, Elliot, Sarrazin, Da Fonséca, & Rufo, 2002; Ferrer-Caja & Weiss, 2000; Kavussanu & Roberts, 1996). The current study tested a hypothetical model through a prospective research design that may explain adolescent motivation toward physical activity in physical education through combining elements of three theories (achievement goal theory [motivational climate], self-efficacy theory [self-efficacy], and self-determination theory [intrinsic motivation]). Specifically, the main purpose of this study was to determine if self-efficacy and intrinsic motivation mediate the relationship between adolescents' perceptions of their physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) and subsequent physical activity within an integrated model.

Relevance of Achievement Goal Approach

Achievement goal theory (Ames, 1992; Dweck, 1986; Nicholls, 1984, 1989) was a foundational framework in this study in an effort to gain a better understanding and explain the antecedents of physical activity behavior. Achievement goal theory is a major motivational theoretical paradigm in the physical domain (Duda & Hall, 2002). Achievement goal theory assumes the individual is actively involved in deciding and directing their achievement goal behavior (Duda & Hall, 2002; Roberts, 1992). Achievement goal theorists also assume achievement behavior is a function of the personal meaning a person attaches to the outcome (perceived success and failure) of the goal attainment (Duda & Hall, 2002; Roberts, 1992). Thus, achievement goal theorists

assume that the thought process to elect to invest in any activity, the effort exerted on the task, the persistence level shown when facing challenges, and the product of that thought process and emotional response come from the meaning that is attached to one's achievement striving (Duda & Hall, 2002). The personal meaning attached to one's achievement behavior or one's goal of action, therefore, must be understood to determine the individual's motivation towards physical activity in achievement settings such as physical education. However, achievement goal theorists contend that there is not only one goal of action but multiple goals of action (Roberts, 1992). The goal of action that the individual chooses then defines the process of why a person decides to approach or avoid certain activities or tasks with different levels of engagement, and different responses to achievement outcomes (Duda & Hall, 2002). Although there are many achievement goals possible, consistent research findings support the hypotheses of Maehr and Nicholls (1980) that identified two specific achievement goals. These goals are referred to as task and ego goal orientation or also called dispositional goals.

Adolescent Dispositional Goals in Achievement Goal Theory

Working to define task and ego goal orientations, Nicholls (1984) argued that individuals adopt different goals of action and display different levels of effort based on how they view their competence in an activity or task. Task goal oriented individuals focus on the development of competence and believe that competence increases when proper effort is applied (Nicholls, 1989). Ego goal oriented individuals seek to demonstrate competence by outdoing others and effort is less likely to be an important

cause of that success (Nicholls, 1989). Task goal oriented people, regardless of their perceived competence or ability level, are hypothesized to choose moderate to difficult tasks and are concerned with mastery of the task, whereas ego goal oriented individuals' perceptions of competence or ability are dependent upon how they compare to others in a similar achievement task (Duda, 1994).

Task goal orientation has been linked to higher effort and greater task performance, both of which encourage, a more physically active lifestyle (Duda, 1989; White, Duda, & Keller, 1998). Additionally, regardless of perceived ability on an activity, researchers have positively correlated task goal orientation in physical education settings with team-oriented work, effort towards opportunities to show improvement, and mastery of a task or skill (Papaioannou & McDonald, 1993; Walling & Duda, 1995). Conversely, predominately ego goal oriented individuals' effort and success on tasks was largely dependent upon their perceived ability. Individuals with low levels of perceived ability tend to exert lower effort in competitive situations to protect their self-worth whereas those with high levels of perceived ability will attempt to demonstrate their superiority over others through minimal effort. Identifying an individual's goal oriented motivation, therefore, becomes critical to better predict subsequent behavior and decision-making of whether to be more or less active in physical education classes. However, Nicholls (1989) argued that knowledge of dispositional goals, although fairly constant over time, may not be providing the complete picture in achievement settings. Dispositional goals are not only affected by perceptions of competence but also by the motivation characteristics of the situation.

Extending to Situational Goals in Achievement Goal Theory

Ames (1992) said a fundamental tenet of achievement goal theory is the role the situation plays in the motivational process. Achievement goal orientations are assumed to differ as a result of the situational demands present in the achievement setting (Maehr, 1984). The situation has the potential of making task and ego goals differentially salient across individuals. In other words, the extent to which an individual adopts a task or ego goal orientation depends on how the individual views the motivational goal structure or motivational climate of the achievement setting. The motivational climate is the perceived goal structure of the achievement environment (Ames, 1992). There are two dimensions of motivational climate. These are referred to as mastery (task-involving) and performance (ego-involving) climate. Mastery climates focus on learning and task competence in which effort and cooperation are supported (Ames & Archer, 1988). Performance climates emphasize situations that foster comparisons to others and competition between peers that involves a punishment oriented approach utilized by coaches and teachers when mistakes are made by athletes or students (Ames & Archer, 1988).

In a literature review, Ntoumanis and Biddle (1999) indicated there was consistent support for a mastery climate leading to more adaptive motivational outcomes (e.g., positive attitudes toward the lesson and intrinsic motivation) than a performance climate in sport and physical education, which led to few or negative responses. Furthermore, perceptions of a mastery climate were positively related to self-regulated behavior when considered in conjunction with perceived ability that was predictive of physical activity

(Parish & Treasure, 2003), whereas perceptions of a performance climate led to more extrinsic and amotivated behavior and were unrelated to physical activity behavior (Parish & Treasure, 2003). These findings were also supported in intervention studies. Students in a perceived mastery climate reported a greater likelihood of future participation and enjoyment than in a performance climate (Lloyd & Fox, 1992; Solmon, 1996; Treasure & Roberts, 2001). These consistent findings speak to the importance of physical educators creating and incorporating mastery oriented climate into their physical education curriculum.

Although the research is supportive of a mastery-oriented climate, it is important to note that the perceived motivational climate is focused solely on the perceived goal structure in the overall learning environment created by the leader. There are many other potential situational demands or factors that could influence physical activity behavior of adolescents such as leadership styles, activity choice (cooperative and competitive), sense of belonging, and whether the participants perceive the environment to be interpersonally inviting and caring. Also recently, there have been advancements to the perceived motivational climate. Based on the growing body of work regarding a perceived caring climate and the need to explore the recent advancements of the perceived motivational climate and their affect on physical activity behavior, the current study created and examined a new umbrella term referred to as the physical education climate. The physical education climate in this study incorporated the recent advancements of the perceived motivational climate (e.g., a teacher's emphasis on mastery goals, performance-approach goals, performance-avoidance goals, and social approval goals) as well as incorporating

perceptions of a caring climate. The perceived physical education climate and its influence on individual factors (e.g., self-efficacy and intrinsic motivation) as well as on physical activity behavior are elaborated upon in the next several sections.

Extending to Trichotomous Achievement Goal Model and Assessment

In the past 2 decades there have been changes in achievement goal theory research. Traditionally achievement goal theory has been a dichotomous approach for both dispositional and situational goals. Dispositional goals or termed task and ego goal orientations are conceptualized to undergird motivation, whereas situational goals (i.e., mastery, and performance) are viewed as the goal structure of the achievement environment (Roberts, 1992). Elliot and his colleagues argued that the dichotomous approach is limited conceptually and has yielded mixed experimental results (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). The motivational outcomes of task and ego dispositional goals and mastery and performance situational goals can be better understood if performance goals (viewed as a single dimension in the classic view) were portioned out into an approach-avoidance dimension (Elliot & Church, 1997; Elliot & Harackiewicz, 1996).

Performance goals have been integrated with the direction of an individual's striving. Individuals with a performance goal orientation either strive to demonstrate competence (approach) or avoid demonstrating incompetence (avoidance). Elliot and Harackiewicz (1996) referred to this new extension as a trichotomous approach, which makes use of both the performance-mastery and approach-avoidance distinctions. In this

framework, performance goals are portioned into performance-approach and performance-avoidance goals, whereas mastery goals remained the same as conceived in the original theory. Elliot and Harackiewicz (1996) viewed the trichotomous approach as critical to understanding and optimizing motivation.

Similar to a task goal orientation, a mastery goal focuses on obtaining competence in an activity or task. A performance-approach goal oriented individual focuses on seeking favorable judgments toward their competence on an activity or task, whereas a performance-avoidance goal oriented individual focuses on not obtaining unfavorable judgments on their competence toward an activity or task (Elliot, 1999). There has been clear empirical support for the trichotomous conceptualization of achievement goals in the classroom setting validating the independence of these three goals (Elliot, 1999). It is important to note that in a recent study by Papaioannou, Tsigilis, Kosmidou, and Milosis (2007) the trichotomous dispositional goals (i.e., mastery, performance-approach, and performance-avoidance goals) are also viewed as the situational goal structure depending on which of the trichotomous dispositional goals are being activated by the leader in that setting.

Elliot and Harackiewicz (1996), in two separate experiments, demonstrated differential effects for the two performance goal manipulations (i.e., performance-approach, and performance-avoidance) in predicting intrinsic motivation. Most achievement goal and intrinsic motivation theorists contend that the classic mastery goal view is facilitative of intrinsic motivation, whereas the classic performance goal single dimension view is posited to have negative effects on intrinsic motivation (Deci & Ryan,

2000; Roberts et al., 2007). In the first experiment, a single dimension performance goal view did not undermine intrinsic motivation relative to the single dimension mastery goal view. However, when the single dimension performance goal view was portioned out, the performance-avoidance goal view did have negative effects on intrinsic motivation but the performance-approach goal view was similarly positively predictive of intrinsic motivation as the mastery goal view.

Experiment 2 largely replicated the findings from Experiment 1 to further verify the generalizability of the effects and the predictive utility of the trichotomous goal approach. The results of Experiment 2 again indicated that performance-avoidance participants reported lower intrinsic motivation on the task than performance-approach individuals. Later, Elliot and Church (1997) successfully demonstrated in a classroom setting that the two performance goals could be measured separately through a self-report measure, which provided further support for the trichotomous goal approach. Overall, there is strong empirical support for the trichotomous goals approach in achievement motivation. Performance-approach goals were related to mostly positive motivational processes and outcomes such as higher task absorption, increased task persistence, higher performance, and intrinsic motivation, whereas performance-avoidance goals were opposite in relation to these variables (Elliot, 1999).

Researchers have continued to expand achievement goal theory as Elliot and McGregor (2001) further separated mastery goals into mastery-approach (positively approach success while focusing on learning a task) and mastery-avoidance (negatively avoid making mistakes but focus on improvement or perfection) in their model. The

current study did not include this new dimension because there were still concerns that students could not distinguish between teaching practices that activate mastery-avoidance goals from teachers who activate performance-avoidance goals (Papaioannou et al., 2007). Overall, the trichotomous goals approach to achievement motivation potentially offers teachers additional information about the effects of teaching practices that support either mastery goals, performance-approach goals, or performance-avoidance goals. Although recent research found strong support for the trichotomous approach, it is important to note that there has been very little research examining the effects of the teacher's emphasis on the portioned goals in the physical education setting (Papaioannou et al., 2007).

The study of Papaioannou and his colleagues (2007) was the only one that did test the teacher's emphasis on trichotomous goals approach in physical education. In this study, the researchers developed a reliable and valid measure to assess the perceived motivational climate or the teacher's emphasis on these new goal extensions for adolescents. The research findings were consistent with the previous classic motivational climate findings in physical education regarding perceived mastery climate being positively related with intrinsic motivation (Ntoumanis & Biddle, 1999). A teacher's emphasis on mastery goals was similarly positively related with intrinsic motivation and satisfaction in physical education. However, the research study also revealed unexpected results with regard to the teacher's emphasis on the portioned performance goals (i.e., performance-approach, and performance-avoidance) with both being either unrelated or having a low negative relationship with intrinsic motivation. These findings were not

expected by the researchers as previous research findings on the separation of performance goals indicated differentiated effects on intrinsic motivation with performance-approach being more similarly positively linked to intrinsic motivation as a mastery goal (Cury et al., 2002; Elliot & Harackiewicz, 1996). The inconsistent findings for the teacher's emphasis on the portioned performance goals are surprising because previous studies indicated differentiated effects for performance goals as being consistent across age groups, settings, and tasks performed (Roberts et al., 2007). Papaioannou and his colleagues argued that these unexpected findings might simply provide evidence that separating these two goals may have little relevance for teaching and that perhaps the students could not differentiate between performance-approach and performance-avoidance teaching practices. The authors concluded that focusing on a teacher's emphasis on performance-approach goals likely promotes performance-avoidance goals as well. These findings suggest that further research is needed to clarify the predictability of the teacher's emphasis on the portioned performance goals in physical education research.

In addition, Papaioannou and his colleagues in the same study were the first to develop a valid motivational climate measure in physical education that emphasized the teacher's emphasis on not only trichotomous goals but a fourth goal (social approval) was also assessed and reintroduced from the original achievement goal model. A teacher's emphasis on social approval was initially included in the achievement goal framework that also captures an additional element of the perceived learning environment created by the teacher that can influence physical activity behavior. Therefore, the current study

incorporated the climate dimension of a teacher's emphasis on social approval goals within the perceived physical education climate.

Revisiting and Extending to Social Approval Goals

The trichotomous achievement goal framework has provided much insight into achievement motivation in physical education contexts but adolescent students may also have social goals influencing their physical activity behavior. For example, a student may decide to exert more effort if they feel their success is connected to the social approval of others. Social approval motivation, within the specific motivational framework of achievement goal theory, has been linked to the purpose of an individual's achievement striving (Urdan & Maehr, 1995). Maehr and Nicholls (1980) discussed how in one manner individuals define success and judge their competence as based on the social approval associated with exhibiting high effort, virtuous intent, and personal investment in an activity. In other words, Maehr and his colleagues asserted that an individual's perceived social purpose of trying, or not trying, to achieve in an achievement setting is their social approval goal. Although initially viewed as a third achievement goal (Maehr & Nicholls, 1980) in the original achievement goal framework, social approval goals were often omitted in research due to the ambiguity and vastness of social goals research (Papaioannou et al., 2007).

Recently, in sport (Allen, 2003; Stuntz & Weiss, 2009) and physical education (Guan, Xiang, McBride, & Bruene, 2006; Stuntz & Weiss, 2003) research on social goals in general has become more prevalent. However, researchers have argued that the use of

social goals in some of the recent studies (e.g., Allen, 2003; Guan et al., 2006) have been inconsistent with Maehr and Nicholls' original definition by combining social approval goals with ability goals (Papaioannou et al., 2007). The original definition linked social approval goals with effort and not ability (Urdan & Maehr, 1995). Allen (2003) and Urdan and Maehr (1995) hypothesized that those seeking to demonstrate commitment and faithfulness to others will consistently lead to high levels of effort. In fact, a recent study with Greek middle school physical education students found support of social approval goals as not only being independent from the trichotomous goals but positively related to mastery goals, intrinsic motivation, and satisfaction in physical education (Papaioannou et al., 2007). Again, because social approval goals make conceptual and theoretical sense as well as offer researchers additional insight into the students' motivational beliefs or purpose for doing well in school (e.g., physical education), the current study not only incorporated the recent trichotomous achievement goal framework but also assessed the student's perceptions on the teacher's emphasis on social approval goals in physical education. Therefore, a teacher's emphasis on mastery, performance-approach, performance-avoidance, and social approval goals makes up the recent extensions of the perceived motivational climate. The remaining climate variable incorporated within the perceived physical education climate umbrella term in this study is a perceived caring climate.

Physical Education Climate and Inclusion of Caring Climate

Many researchers in educational settings have emphasized the influential role the situation plays in student motivation but have largely omitted the role caring plays in establishing an effective culture for learning (Noblit, 1993; Noddings, 1992). The concept and the impact of caring, however, has been found difficult to define and quantitatively measure. Noddings (1992) conceptualized caring as a relationship between two people with one being the carer and the other being the cared-for and that the relationship has an open line of verbal and nonverbal communication between the individuals. Essentially, caring seems to capture what is often emphasized by educational professionals as being critical to developing a classroom environment that produces effective pedagogy. Caring captures the affective and relational elements between individuals. Additionally, caring been shown to be positively related towards future anticipated involvement in a physical activity program among youth (Newton,Watson, Gano-Overway et al. 2007). Hellison (2000) viewed caring as being crucial in promoting physical activity. Additionally, Ennis (1999) viewed caring relationships as critical to grabbing and maintaining the attention of adolescents in academia as well.

As discussed earlier, there has been recent research on better understanding the students' perceptions of the teacher's emphasis on goals structure (i.e., mastery, performance-approach, performance-avoidance, and social approval goals) in physical education. However, until recently, there has been little research as to whether a student perceives a caring climate largely due to a lack of quantitative assessment tool. Until Newton, Fry, Watson et al. (2007), who attempted to quantify and capture the essence of

an environment of caring and developed the Caring Climate Scale (CCS). A caring climate is defined "as the extent to which individuals perceive a particular setting to be interpersonally inviting, safe, supportive and able to provide the experience of being valued and respected" (Newton, Fry, Watson et al. 2007, p. 72). Newton, Watson, Gano-Overway et al. (2007) found that children who perceived the program environment as more caring also perceived the climate to be less performance oriented and indicated a greater likelihood for future involvement in the program. The results from the study indicated the teacher's ability to develop a classroom atmosphere that is physically and psychologically safe appears vital to student engagement in physical education (Magyar et al., 2007; Reeve & Jang, 2006). This recent development of an effective assessment tool to measure a caring climate allows for additional unique characteristics within the class climate to be assessed other than the perceived goal structure to better understand the role a perceived caring climate plays relative to physical activity behavior. Therefore again, the term physical education climate in this study will not only incorporate the teacher's emphasis on activating goals (i.e., mastery, performance-approach, performance-avoidance, and social approval goals) but also include perceptions of a caring climate to all fall under the term perceived physical education climate.

Based on the previous research discussed to this point, the perceived physical education climate variables have been found to have an influence on physical activity behavior (Maehr & Nicholls, 1980; Magyar et al., 2007; Ntoumanis & Biddle, 1999; Papaioannou et al., 2007). However, the essence of the social cognitive approach follows the concept of triadic reciprocal determinism or the interaction between the situation

(e.g., perceived physical education climate) and the individual or personal variables (e.g., self-efficacy and intrinsic motivation) that are likely to influence behavior (e.g., physical activity; Motl et al., 2005). The direct and potential mediated influences between the perceived physical education climate and self-efficacy along with intrinsic motivation relative to physical activity behavior are discussed in the next two sections.

Mediational Role of Self-Efficacy

Many leaders in the physical activity domain assume and believe that if they instill more confidence in their students or athletes that these self-beliefs would translate into improved interest and better performance or improved motivation for physical activity (Chase, 1998). Bandura's (1986, 1997) self-efficacy theory, a social cognitive approach, is the theoretical foundation for these assumptions (Chase, 1998). Self-efficacy represents one's beliefs in their capabilities to learn and perform behaviors at designated levels (Bandura, 1986, 1997). The assumptions the leaders made were relative to self-confidence (a global perception of ability) and should not be confused with self-efficacy. Although the study of more global perceptions of ability has enhanced our knowledge of the relationships between self-beliefs and behavior (e.g., performance), this study focused on obtaining situation and task specific knowledge (basketball) within physical education that may be more useful to teachers to promote student physical activity participation.

As discussed earlier, self-efficacy theory, centered on the concept of reciprocal determinism, assumes bidirectional influences of environmental, individual, and behavioral factors. Therefore, the environmental variables or the perceived physical

education climate as well as the individual variables (e.g., self-efficacy and intrinsic motivation) emphasized in this study can have a direct or mediated influence on behavior (e.g., physical activity participation). Previous research in the physical domain is supportive of the direct influence of the perceived physical education climate variables (Maehr & Nicholls, 1980; Magyar et al., 2007; Ntoumanis & Biddle, 1999; Papaioannou et al., 2007) on physical activity behaviors such as enjoyment, persistence, and effort on a task. Additionally, the direct links between self-efficacy and physical activity behavior has substantively shown to be a consistent correlate (Bandura, 1986, 1997).

More specifically, research on adolescents has consistently found that individuals who feel more efficacious are likely to expend more effort, perform better, and persist longer in sport and physical activity than those with low levels of self-efficacy (Feltz & Magyar, 2006; McAuley, 1992; Moritz, Feltz, Fahrbach, & Mack, 2000). Self-efficacy has also been found to be a strong predictor of students' future participation intentions in physical activity and in future decisions in taking physical education (Gao et al., 2007). The findings suggest that the individual variable self-efficacy has a strong direct relationship with physical activity behavior. Although, based on the concept of triadic reciprocal determinism, the individual variable self-efficacy may also play a role as a mediator being influenced by the perceived physical education climate to subsequently impact physical activity behavior.

Previous research in the physical domain is supportive of the direct influence of the classic perceived motivational climate (Kavussanu & Roberts, 1996; Ntoumanis & Biddle, 1999) on self-efficacy. Classic mastery climate has been found to be positively

related to self-efficacy, whereas classic performance climate has a negative or no relationship to self-efficacy (Cury et al., 1996; Escarti & Gutierrez, 2001; Kavussanu & Roberts, 1996; Kuczka & Treasure, 2005). In addition, along with some empirical support, the perceived physical education climate variables theoretically suggest potential influences on self-efficacy.

In the classrooms, relationships between the trichotomous goals and self-efficacy were examined with mastery goals and performance-approach goals being positively related with self-efficacy, whereas performance-avoidance goals were not related with self-efficacy (Barron & Harackiewicz, 2001; Bong, 2001; Elliot & Church, 1997). Although the research is limited to the classrooms in reference to trichotomous goals and not the teacher's emphasis on trichotomous goals, the relationships provide empirical and theoretical relevance. Given that the conceptual definitions remain the same other than assessing whether the goals are active in the perceived environment, theoretically it makes sense to suggest that if the teacher activated the goals through the situational demands present that the environment would influence an individual's perception of self-efficacy.

Currently, the relationship between social approval and self-efficacy has not been examined. However, as with the teacher's emphasis on trichotomous goals it does make theoretical and conceptual sense that a positive relationship would emerge between the two variables for the adolescent population. For example, obtaining social approval from one's peers is likely to be more important for this age group due to the importance of

social relations that potentially may result in greater effort and personal investment on the task and subsequently lead to higher self-efficacy.

Similar to social approval goals, there is no research linking a caring climate directly to self-efficacy (e.g., basketball). Although, there is a recent study that examined perceptions of a caring climate in relation to affect self-efficacy (emotional competence necessary for interpersonal relationships; Gano-Overway et al., 2009) rather than task self-efficacy (basketball) incorporated in this study. The findings indicated that a caring climate was positively predictive of affect self-efficacy that was also linked to prosocial behaviors. Gano-Overway and her colleagues (2009) indicated that these positive relationships could suggest that a caring climate can encourage helping behaviors and positive social relations. Therefore, conceptually it makes sense that if a perceived caring climate can improve social relations and helping behaviors then perhaps a caring climate could also lead to greater cooperative effort on tasks and potentially result in greater task self-efficacy.

Overall, the research indicated direct links between both the perceived environment (e.g., perceived physical education environment) and self-efficacy to physical activity behavior, respectively. In addition, although with limited empirical research, theoretical and conceptual links point to a potential direct influence between the perceived physical education environment variables on self-efficacy. Based on the concept of reciprocal determinism, the bidirectional relationships between environmental (e.g., perceived physical education climate), individual (e.g., self-efficacy), and

behavioral factors (e.g., physical activity behavior) indicate that these relationships can possibly be further explained by mediation.

In a 1-year prospective intervention study with 2840 middle school students, researchers studied mediation effects of psychosocial determinants of physical activity (self-efficacy, attitude, social-support, perceived benefits, and barriers) to determine changes in physical activity that included programs with and without parental support (Haerens et al., 2007). The researchers indicated that a positive change in physical activity behavior in the adolescents was mostly explained by increases in self-efficacy combined with parental support. These findings suggest that self-efficacy may be a mediating variable between environmental factors and physical activity behavior but the findings are limited and more research is needed. In addition, research in the physical domain has also identified another potential mediating individual variable referred to as intrinsic motivation as being a strong correlate of physical activity behavior but is also influenced by environmental factors (Cury et al., 2002; Kavussanu & Roberts, 1996; Papaioannou et al., 2007).

Mediational Role of Intrinsic Motivation

It has been suggested that adolescents engage in sport and physical activity for enjoyment and intrinsic interest (Vallerand, Deci, & Ryan, 1987). Yet, physical education research studies in the UK (Van Wersch et al., 1992) and in Greece (Papaioannou, 1997) have reported that participation and interest in physical education gradually declines with age. There is also a similar trend occurring in the United States (U.S. Division of

Nutrition, Physical Activity and Obesity, 2008). Currently there is consensus among researchers that the individual variable intrinsic motivation is of central importance not only to physical education research but as an outcome variable to achievement goal literature as well (Cury et al., 2002; Vallerand, 2007). In fact, intrinsic motivation has been one of the most widely studied concepts in physical education (Hassandra, Goudas, & Chroni, 2003).

Deci and Ryan (1980, 1985, 1991, 2000) have incorporated intrinsic motivation into their self-determination theory and defined intrinsic motivation as an individual involved in performing something for its own sake rather than as a means to an end (i.e., extrinsic motivation). Other researchers have further clarified the meaning of intrinsic motivation as internal motivation to experience pleasure or satisfaction while learning, exploring, or attempting to learn something novel (Vallerand, Blais, Briére, & Pelletier, 1989). Similar to self-efficacy, intrinsic motivation has also been found to be influenced by classic dispositional and situational goals as well as by the perceived physical education climate variables (Brown & Fry, 2009; Cury et al., 2002; Kavussanu & Roberts, 1996; Papaioannou et al., 2007). Other researchers also identified intrinsic motivation as a central antecedent of physical activity behavior (e.g., improved motivation, effort, persistence, and intention to be physically active; Ferrer-Caja & Weiss, 2000; Sproule, Wang, Morgan, McNeill, & McMorris, 2007; Xiang, Chen, & Bruene, 2005).

More specifically, Xiang and colleagues (2005) found elementary student interest or intrinsic motivation as a strong predictor for future motivation for running. Similarly,

Ferrer-Caja and Weiss (2000) among adolescent students in physical education identified intrinsic motivation as directly predicting effort and persistence in the class activities. The strong association between intrinsic motivation and physical activity behavior has been found across cultures as well. For instance, adolescents in Singapore positively associated intrinsic motivation with intention to be physically active (Sproule et al., 2007). However, based on the concept of reciprocal determinism, the individual variable intrinsic motivation may also be influenced by other factors within the environment or the individual to subsequently affect physical activity behavior.

Qualitative researchers recently examined factors associated with intrinsic motivation for participation in secondary physical education (Hassandra et al., 2003). The researchers indicated both individual differences (e.g., sense of competence, sense of autonomy, outcome expectancy, and athletic physical appearance) and social environmental factors (e.g., school environment, physical educator, lesson content, schoolmates, family, media, cultural values, sense of relatedness, and a cooperative learning environment) could influence student intrinsic motivation. These findings point out the challenge researchers are currently facing trying to identify potential factors influencing intrinsic motivation and subsequent behavior. This study, due to following a social-cognitive perspective that provided empirical and theoretical links, chose to focus on the association between the perceived physical education climate variables to intrinsic motivation and subsequent physical activity behavior to suggest a potential mediational role for intrinsic motivation.

A vast majority of the research has examined the dichotomous view of the dispositional and situational goals to intrinsic motivation (Ntoumanis & Biddle, 1999; Roberts et al., 2007). Task-oriented goals and a mastery climate have both been conceptually (Nicholls, 1984, 1989) and empirically linked to intrinsic interest (Petherick & Weigand, 2002; Seifriz et al., 1992) whereas ego-oriented goals and a performance climate have been inversely related with intrinsic motivation (Duda, Chi, Newton, Walling, & Catley, 1995). However, recently researchers have begun to assess the motivational climate through the recent extensions on achievement goals (e.g., trichotomous goals) as the teacher's emphasis on goals.

Past research on the recent goal extensions suggested that mastery, performance-approach (Elliot, 1999), and social approval goals (Urdan & Maehr, 1995) led to intrinsic motivation and higher perceived effort and performance, whereas performance-avoidance goals were inversely related to intrinsic motivation with lower perceived effort and performance (Elliot, 1999). These findings were largely replicated in a very recent study by Papaioannou and his colleagues (2007) with adolescents in physical education when they assessed a teacher's emphasis on achievement goals (i.e., mastery, performance-approach, performance-avoidance, and social approval) in relation to intrinsic motivation. A teacher's emphasis on mastery and social approval goals was reported to facilitate intrinsic motivation and satisfaction in physical education. On the contrary, a teacher's emphasis on performance-approach and performance-avoidance was unrelated and low negatively related to intrinsic motivation and satisfaction in physical education, respectively. Based on previous research findings, the unrelated relationship between

performance-approach and intrinsic motivation was inconsistent with other studies (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). The researchers argued the result by theorizing that perhaps the students were not able to differentiate between teaching practices that emphasize performance-approach and performance-avoidance goals resulting in the inconsistent relationship. Further research is needed to clarify the relationships between the teacher's emphasis on the portioned performance goals to intrinsic motivation and whether adolescents can differentiate between the two teaching practices.

Currently there is no literature examining the impact of a perceived caring climate on an individual's intrinsic motivation. However, Brown and Fry (2009) very recently presented at a national conference (American Alliance for Health Physical Education Recreation and Dance) a study that examined the impact of the class environment (e.g., caring climate and task-involving climate) on exercise participants' motivational responses (e.g., intrinsic motivation) to physical activity. They found that college-aged exercise participants who perceived a caring climate also reported higher intrinsic motivation, effort, competence, and commitment to future exercise. Further research is needed to better understand the association between a perceived caring climate and intrinsic motivation but this study does provide initial support of a positive relationship between the two variables while also indicating improved overall motivation for physical activity.

Overall, intrinsic motivation has been shown to be a consistent positive determinant of physical activity behavior resulting in improved motivation, effort,

persistence, and intention to be physically active (Ferrer-Caja & Weiss, 2000; Sproule, Wang, Morgan, McNeill, & McMorris, 2007; Xiang, Chen, & Bruene, 2005). Also, relying on the social-cognitive approach and the concept of reciprocal determinism, previous research has shown bidirectional influences between environmental (e.g., perceived physical education climate), individual variables (e.g., intrinsic motivation and self-efficacy), and behavior (e.g., physical activity; Brown & Fry, 2009; Elliot, 1999; Papaioannou et al., 2007; Urdan & Maehr, 1995).

Despite the bidirectional influences, the majority of the studies that examined the antecedents (e.g., perceived physical education climate) and outcomes (e.g., physical activity behavior) of intrinsic motivation have relied on causal designs as opposed to mediational analysis (Cecchini et al., 2001; Cury et al., 1996; Escarti & Gutierrez, 2001; Ferrer-Caja & Weiss, 2000; Sproule et al., 2007; Standage, Duda, & Ntoumanis, 2003). Causal designs provide insight into the relationships between the variables but mediation analysis helps researchers determine direct and indirect influences on the outcome variable as well as whether the mediators are critical to influencing change in the outcome variable or not (Preacher & Hayes, 2008). Further, multiple mediation analysis may provide insight as to which individual variables (e.g., self-efficacy and intrinsic motivation) offer the best explanation regarding the impact of the perceived physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) and physical activity behavior.

Determinants of Physical Activity Behavior

Operational definitions in physical activity research have varied greatly (Nahas, Goldfine, & Collins, 2003). To avoid confusion, the current study referred to physical activity as any bodily movement resulting in a step-count measured by a pedometer as a result of expended energy (Caspersen, Powell, & Christensen, 1985). Again, the current study focused on a social cognitive approach to understand the motivational determinants of physical activity behavior. Very few studies (Gao et al., 2007; Morgan et al., 2008; Trost et al., 1999) examining motivational determinants of physical activity in the physical education domain have attempted to directly and objectively measure physical activity. Instead the majority of the research has relied on self-reports to capture behavioral terms such as effort, performance, persistence, or intentions to engage in future activities or tasks to suggest physical activity behavior change.

In general, the research has shown that participants in mastery climates reported greater effort (Cury et al., 1996; Duda & Nicholls, 1992; Solmon, 1996) and performance (Sarrazin, Roberts, Cury, Biddle, & Famose, 2002) than participants perceiving performance climates with low perceived ability. These low perceiving performance climate participants reported reduced effort as opposed to participants with high perceived ability (Sarrazin et al., 2002). In addition, the leader's ability to develop an atmosphere that is physically and psychologically safe appears vital to participant engagement (Magyar et al., 2007; Reeve & Jang, 2006). Brown and Fry (2009) found that college-aged exercise participants who perceived a caring climate reported greater perceived effort and commitment to exercise. Also, Papaioannou and his colleagues

(2007) measuring a teacher's emphasis on trichotomous goals and social approval goals positively correlated a teacher's emphasis on mastery goals and social approval goals to intrinsic motivation and satisfaction in physical education. However, the same study yielded mixed findings regarding the teacher's emphasis on performance goals to intrinsic motivation with perceived ability possibly influencing the findings. Again, these differential findings regarding perceived ability may also point to self-efficacy research based studies to better understand the relationship between the portioned performance goals and physical activity behavior.

Self-efficacy has been found to be a strong direct predictor of physical activity behavior (Bandura, 1997; Gao et al., 2007; Trost et al., 1999). More specifically, research on adolescents has consistently found that individuals who feel more efficacious are likely to expend more effort, perform better, persist longer, and are more likely to continue being active in sport and physical activity than those with low levels of self-efficacy (Feltz & Magyar, 2006; Gao, et al., 2007; McAuley, 1992; Moritz, Feltz, Fahrbach, & Mack, 2000). In fact, self-efficacy and intrinsic motivation both have been found as strong correlates of physical activity. Overall, intrinsic motivation has also been shown to be a consistent positive determinant of physical activity behavior resulting in improved motivation, effort, persistence, and intention to be physically active (Ferrer-Caja & Weiss, 2000; Sproule, Wang, Morgan, McNeill, & McMorris, 2007; Xiang, Chen, & Bruene, 2005). Overall, relying on a social cognitive approach, theoretical and empirical evidence suggests the perceived physical education climate variables (e.g., mastery, performance-approach, performance-avoidance, social approval, and caring

climate) as well as the individual variables (e.g., self-efficacy and intrinsic motivation) are strong determinants of physical activity behavior.

Assessment of Physical Activity Behavior

It is still a challenge today to accurately assess adolescents' physical activity (Kohl, Fulton, & Caspersen, 2000). There are multiple categories of techniques (e.g., self-report measures, direct observation, monitoring devices, etc.) used to assess adolescents' physical activity with each having their own strengths and weaknesses (Kohl et al., 2000). The choice of which particular physical activity assessment method to use largely depends on the design of the study and the age of the participants (Kohl et al., 2000).

Pedometers, a type of monitoring technique that detects motion, have become increasingly popular in physical education studies to look at the students' step counts because they are relatively inexpensive, unobtrusive (Bassett et al., 1996), and their output (step counts) is easily understandable (Schneider, Crouter, & Bassett, 2004). Accelerometers, another monitoring technique, although more accurate than pedometers in assessing physical activity, are expensive and not always the more practical choice in physical education research. In short, pedometers allow for objective, reliable, and practical measurement of physical activity (Kohl et al., 2000; Trost, 2001). Yet, there has been no research to date in achievement motivation based physical education research attempting to quantify physical activity through pedometers (step counts; Roberts et al., 2007). Instead, achievement motivation research in physical education has largely relied

on self-report methods (e.g., questionnaires) to assess physical activity behaviors (Roberts et al., 2007). To reduce measurement errors of self-report measures (e.g., recall, individual biases) and due to the large number of participants in this study the current study's focus was toward the more objective and inexpensive technique (e.g., pedometers) of measuring physical activity.

Summary and Aims of Study

A better understanding of the antecedents of physical activity behavior was important for addressing and potentially reversing inactivity rates and interest in physical education programs amongst adolescents to help reduce the prevalence of health problems in later adulthood. Identifying variables that are predictive of physical activity behavior was facilitated by adopting a social cognitive approach. Emerging to the forefront were three theories and this study integrated elements of these three theories based on empirical and theoretical links between them (achievement goal theory [motivational climate], self-efficacy theory [self-efficacy], and self-determination theory [intrinsic motivation].

The overall theoretical framework for the study largely followed recent extensions of achievement goal theory (including some classic conceptions) to determine the influence of the teacher's emphasis on trichotomous goals (i.e., mastery, performance-approach, and performance-avoidance) on physical activity behavior. Additionally, a teacher's emphasis on social approval goals and perceptions of a caring climate were incorporated along with the teacher's emphasis on trichotomous goals to create an

umbrella term referred to in this study as the perceived physical education climate. Theoretical underpinnings and empirical links warranted inclusion for a teacher's emphasis on social approval goals and perceptions of a caring climate because the variables provided additional insight into the perceived learning environment in physical education settings that may affect individual variables (e.g., self-efficacy and intrinsic motivation) and physical activity behavior. In addition, this study followed the concept of triadic reciprocal determinism (a social-cognitive approach) indicating bidirectional influences between environmental (e.g., perceived physical education climate), individual (e.g., self-efficacy and intrinsic motivation), and behavioral factors (e.g., physical activity behavior; Barron & Harackiewicz, 2001; Bong, 2001; Brown & Fry, 2009; Elliot, 1999; Elliot & Church, 1997; Papaioannou et al., 2007; Urdan & Maehr, 1995).

More specifically, past research suggested that mastery, performance-approach (Elliot, 1999), and social approval goals (Urdan & Maehr, 1995) led to intrinsic motivation and higher perceived effort and performance, whereas performance-avoidance goals were inversely related to intrinsic motivation with lower perceived effort and performance (Elliot, 1999). Recently, Papaioannou and his colleagues (2007) largely supported the trichotomous goals research while assessing the teacher's emphasis on goals. The researchers found that a teacher's emphasis on mastery and social approval goals positively related to intrinsic motivation and satisfaction in physical education. However, the same study found that when a teacher's emphasis is on performance-approach goals the students were not able to differentiate between teaching practices that emphasize performance-approach and performance-avoidance goals. Further research is

needed to clarify the issue as to whether perceived self-efficacy plays a role as mediator between the motivational climate and physical activity.

The current study also included students' perceptions of a caring climate that could provide additional knowledge as to the role the physical educator plays in creating a class climate in influencing self-efficacy, intrinsic motivation, and physical activity. Recent research in the physical domain has found support that leaders who create a caring climate has led to participants reporting higher intrinsic motivation, higher perceived competence, greater effort, future anticipated involvement, and commitment to physical activity (Brown & Fry, 2009; Magyar et al., 2007; Newton, Watson, Gano-Overway et al. 2007; Reeve & Jang, 2006).

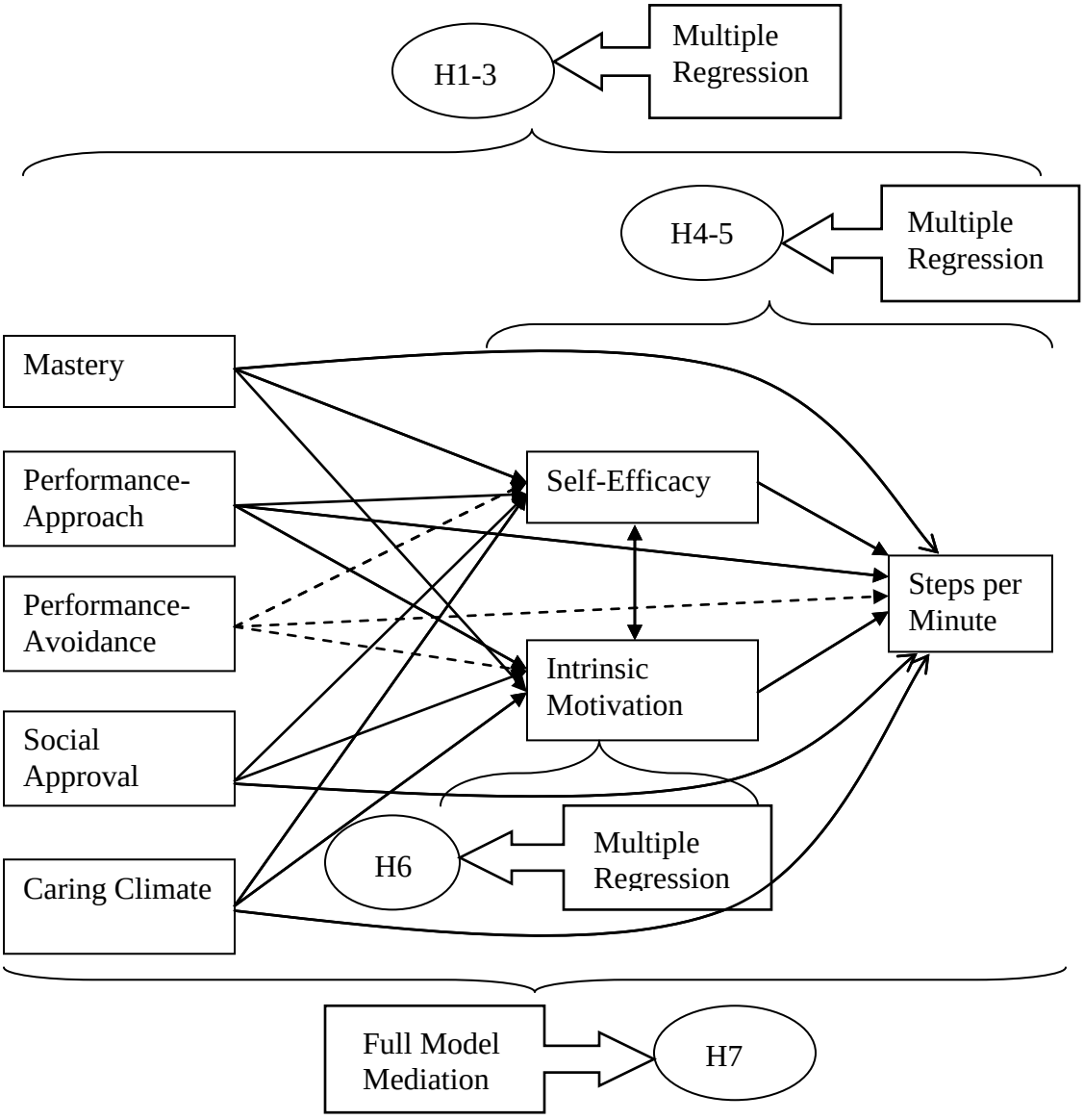
This study also incorporated self-efficacy and intrinsic motivation as individual predictors and as mediators of physical activity, which was measured practically and objectively through pedometers. Self-efficacy (Bandura, 1997; Gao et al., 2007) and intrinsic motivation (Vallerand, 2007) have both been found to be strong correlates of the perceived physical education climate (i.e., teacher's emphasis on mastery goals, performance-approach goals, performance-avoidance goals, social approval goals, and caring climate) and physical activity but as mediators of physical activity behavior as well (Hein & Muur, 2004; Lee, Landin, & Carter, 1992). Overall, due to the concept of reciprocal determinism and consistent correlations indicating bidirectional influences between the perceived physical education climate variables, individual variables (i.e., self-efficacy and intrinsic motivation), and physical activity behavior that the individual variables self-efficacy and intrinsic motivation may best be incorporated into an

integrated model as mediators between the physical education climate and physical activity.

Therefore, the main purpose of this study was to determine whether self-efficacy and intrinsic motivation mediate the relationship between adolescents' perceptions of their physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) and their subsequent physical activity participation. Additionally, this study sought to examine alternative models such as the physical education climate variables, self-efficacy, and intrinsic motivation having direct effects on physical activity, each independently, rather than a mediating effect. As well as examining the interrelationship between self-efficacy and intrinsic motivation (see Figure 1).

Significance of Study

This study should provide insight on the motivational antecedents of physical activity concerning adolescents (junior high school students in physical education) who may be at risk for obesity and future inactivity. Further, findings from the study may help modify the current theories (e.g., achievement goal theory, self-efficacy theory, and self-determination theory) and clarify for physical educators the positive and negative impact that physical education environments may have on students' self-efficacy and intrinsic motivation in physical education classes. Additionally, this study also contributes to enhancing objective knowledge about children's physical activity levels (i.e., step counts) in relation to the physical education climate.



Note: Solid arrows designate a positive link; broken arrows designate a negative link.
Figure 1. Proposed hypotheses and statistical analyses.

Problem Statement

Many of today's youth are turning away from physical activity and physical education that could impact their future level of participation in early and later adulthood and their overall health. Further, there has been limited research studying the motivational processes that may influence active participation in physical education. Physical educators today are asked to get students more active in class but there is little research to suggest what type of environment actually maximizes students' actual step counts. Finally, there is no research that helps physical educators understand the impact the physical education environment has on students' perceptions of self-efficacy and intrinsic motivation towards basketball and how that impacts the students' actual step counts.

Research Questions

As currently conceived, physical education climate is represented by five measured variables, namely, perceived mastery goal, perceived performance-approach goal, perceived performance-avoidance goal, perceived social approval goal, and perceived caring climate. This study was designed to investigate the following research questions:

1. Are perceptions of a physical education climate independently related to physical activity?
2. Are perceptions of a physical education climate independently related to intrinsic motivation?

3. Are perceptions of a physical education climate independently related to self-efficacy?
4. Is self-efficacy related to physical activity?
5. Is intrinsic motivation related to physical activity?
6. Is self-efficacy interrelated with intrinsic motivation?
7. Do self-efficacy and intrinsic motivation mediate the relationship between perceptions of a physical education climate and physical activity?

Hypotheses

The following hypotheses were tested in this study:

1. Perceptions of a physical education climate are related to physical activity, more specifically, perceived mastery goal, perceived performance-approach goal, perceived social approval goal, and perceived caring climate are positively correlated with physical activity and perceived performance-avoidance is negatively correlated with physical activity.
2. Perceptions of a physical education climate are related to intrinsic motivation, more specifically, perceived mastery goal, perceived performance-approach goal, perceived social approval goal, and perceived caring climate are positively correlated with intrinsic motivation, and perceived performance-avoidance is negatively correlated with intrinsic motivation.
3. Perceptions of a physical education climate are related to self-efficacy, more specifically, perceived mastery goal, perceived performance-approach goal,

perceived social approval goal, and perceived caring climate are positively correlated with self-efficacy, and perceived performance-avoidance is negatively correlated with self-efficacy.

4. Self-efficacy is positively related to physical activity.
5. Intrinsic motivation is positively related to physical activity.
6. Self-efficacy is positively related with intrinsic motivation.
7. Self-efficacy and intrinsic motivation mediate the relationship between perceptions of a physical education climate and physical activity.

Limitations

The following limitations could have influenced the results of this study:

1. This study was limited to junior school physical education students located within the Southwest region of the United States, which may limit the generalizability of the study's results beyond this sample.
2. Participants were selected through convenience sampling.
3. Variation may exist in skill level among participants.
4. Variation may exist in the physical educators' teaching experiences that may lead to students having more or less physical activity.
5. All of the physical educators may have created identical climates.
6. Variation may exist in participants' preferred activities, instead of basketball.
7. Pedometers were limited to lower body movement and may have not registered upper body movement such as shooting a free throw.

8. Pedometer data were self-reported.

Delimitations

The following delimitations were recognized:

1. Participants ranged in age from 12-15 years of age.
2. Participants were asked to participate in only one sport, basketball.
3. Participants answered the surveys and wore pedometers on a voluntary basis.
4. Participants reported their own actual step counts from the pedometer to their folder.

Assumptions

The following assumptions were recognized for this study:

1. Participants would understand and respond to the questionnaires honestly and to the best of their ability.
2. Participants would not be influenced by the presence of the primary investigator or assistant.

Definition of Terms

Achievement Goal Theory: A social-cognitive approach to human motivation. The central tenet is that achievement behavior is a function of the personal meaning an individual assigns to perceived success and failure relative to their perceived ability (Maehr & Braskamp, 1986).

Achievement Behavior: Defined as behavior directed at developing or demonstrating high rather than low ability (Nicholls, 1984).

Approach-Avoidance Distinction: A recent extension of the achievement goal theory that represents an integration of classic and contemporary approaches to achievement motivation; approach and avoidance motivation is differentiated as a result of the function of valence. Valence refers to the degree the focal outcome is pleasant or not (Elliot, 1999). Approach motivation is when the individual is striving for competence and their behavior is initiated by a positive and a possible desirable event or outcome (Elliot, 1999). Conversely, avoidance motivation is striving away from incompetence and is instigated by unpleasant outcomes or the possibility of an undesirable event or outcome (Elliot, 1999).

Caring: Is conceptualized as a relation between two people with one being the carer and the other being the cared-for and that the relation has an open line of verbal and nonverbal communication between the individuals (Noddings, 1992).

Caring Climate: Is the extent to which individuals perceive a particular setting to be inviting, safe, supportive, and able to provide the experience of being valued and respected (Newton, Fry, Watson et al. 2007).

Dichotomous Goals: Is a view that the initial approach-avoidance distinction used in achievement goal model that shifted to a performance-learning goal dichotomy with approach and avoidance components of the performance goal collapsed together into a unitary orientation. Nicholls (1984) referred to these dichotomous

goals as task and ego orientation or two forms of approach motivation (Elliot & Harackiewicz, 1996).

Dispositional Goals: Often referred to as task and ego orientation by Nicholls (1984) but other theorists (Dweck, 1986; Dweck & Legget, 1988; Elliot, 1999; Maehr & Braskamp, 1986) view the goals as mastery and performance goals. These goals are viewed as cognitive schemas or a personal theory of achievement that are dynamic and subject to change as information pertaining to one's performance on the task is processed but that they are relatively stable over time (Roberts et al., 2007).

Ego Involvement: Refers to the conception that ability is differentiated and perceived ability is relevant, as the individual is trying to demonstrate normative ability, or avoid demonstrating inability, and how his or her ability fares with comparative others becomes important (Roberts et al., 2007).

Ego Goal Orientation: Also referred to as performance and ability goals as well, it is a dispositional goal that when endorsed the major concerns are both the demonstration of one's high ability and the avoidance of demonstrating comparative low ability (Duda & Hall, 2002).

Intrinsic Motivation: This motivation is based on one's needs to be competent and self-determining. It is behavior that is carried out both in the absence of extrinsic reward or punishments and out of interest and enjoyment (Deci & Ryan, 1985; Vallerand et al., 1987). Intrinsic motivation "concerns active engagement with

tasks that people find interesting and that, in turn, promote growth" (Deci & Ryan, 2000, p. 233).

Mastery Climate: This climate refers to structures that support effort, cooperation, and an emphasis on learning and task mastery (Ames, 1992).

Mastery-Approach Goal: Refers to an individual who positively approaches success while focusing on learning a task (Elliot & McGregor, 2001).

Mastery-Avoidance Goal: Refers to an individual who avoids making mistakes but focuses on improvement seeking perfection (Elliot & McGregor, 2001).

Mastery Goal: Focuses on obtaining competence in an activity or task. Mastery goal is a dispositional goal orientation view of Ames (1992) similar to task orientation (see task orientation for complete definition) but also one of the trichotomous goals in the recent extensions of achievement goal theory (Elliot, 1999).

Motivational Climate: Originating in achievement goal theory, it is the perceived goal structure of the achievement environment (Ames, 1992).

Pedometer: An instrument worn by a walker or runner for recording the number of steps taken, thereby showing approximately the distance traveled (Schneider et al., 2004).

Performance Goal: A dispositional goal orientation view of Ames (1992) similar to ego orientation (see ego orientation for complete definition).

Performance-Approach Goal: Focuses on seeking favorable judgments toward their competence on an activity or task (Elliot, 1999).

Performance-Avoidance Goal: Focuses on not obtaining unfavorable judgments on their competence toward an activity or task (Elliot, 1999).

Performance Climate: This climate refers to structures that foster normative comparisons, intrateam competition, and a punitive approach by teachers and coaches to mistakes committed by students (Ames, 1992).

Physical Activity: Refers to any bodily movement resulting in energy expenditure (Caspersen, et al., 1985) and a step-count measured by a pedometer.

Physical Education Climate/Psychological Climate: A term created in this study to reflect the class climate or the student's perceptions of the teacher's emphasis on goals and caring climate in a physical education setting (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate).

Self-Efficacy: Refers to one's beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986).

Situational Goals: The goal structures emphasized in the environment that make it more or less likely that achievement behaviors, thoughts, and feelings associated with a particular achievement goal are adopted (Roberts et al., 2007).

Social Approval Goal: Refers to behavior motivation that exhibits high effort, virtuous intent, and personal investment in the activity (Maehr & Nicholls, 1980).

Social Cognitive Approach: Assumes humans are actively deciding and planning their achievement behavior (Roberts et al., 2007). Three theories within this approach have moved to the forefront of motivation research (achievement goal theory, self-efficacy theory, and self-determination theory; Roberts et al., 2007).

Task Goal Orientation: Also referred to as learning and mastery goals as well, is a dispositional goal and a fundamental belief that ability and effort covary, such that when effort is applied, competence will increase (Duda & Hall, 2002).

Task Involvement: Refers to the conception of ability being undifferentiated and perceived ability becoming less relevant, as the individual is trying to demonstrate or develop mastery at the task rather than demonstrate normative ability (Roberts et al., 2007).

Triadic Reciprocal Determinism: Assumes bidirectional influences of environmental, individual, and behavioral factors in which the environment can have direct or mediated influences on physical activity behavior (Motl et al., 2005).

Trichotomous Model: Proposed to make use of both the performance-mastery and approach-avoidance distinctions and three independent achievement goals were separated out into a mastery goal, performance-approach goal, and performance-avoidance goal (Elliot, 1999).

CHAPTER 2

LITERATURE REVIEW

This literature review contains three sections (theoretical background, measurement issues, and relevant literature). The first section addressed the historical developments within achievement goal theory to introduce classic views while also characterizing the current views of the theory. Extensions of achievement goals were discussed and explained in terms of recent views of motivational climate through the leader's emphasis of these new goal extensions. Further, the role a caring environment plays within physical activity environments was explored as a tenable extension of the motivational climate and an indicator of the psychological climate. The second section focused on reviewing pertinent psychometric instruments related to the psychological climate and physical activity to make an argument for particular tools available in research today for assessing the psychological climate and physical activity in the physical domain. The third section presented relevant literature to highlight the motivational impact of different psychological climates and a leader's emphasis on goals in physical activity settings towards physical activity behavior as well as examine the role that potential mediators (i.e., self-efficacy and intrinsic motivation) may play between psychological climates and physical activity behavior.

Theoretical Background

Goal Perspective Theory

Achievement goal theory (Ames, 1992; Dweck, 1986; Nicholls, 1984, 1989) has become a major theoretical paradigm in the physical domain and recently in the understanding of student motivation in physical education (Duda & Hall, 2002; Xiang, McBride, & Bruene, 2004). The theory has evolved out of collaborative work in the educational domain by Ames (e.g., Ames, 1984, 1992), Dweck (e.g., 1986; Dweck & Leggett, 1988), Maehr (e.g., Maehr & Braskamp, 1986; Maehr & Nicholls, 1980), and Nicholls (e.g., Nicholls, 1984, 1989). In achievement settings, it has been argued that an achievement goal approach represents an integrated and systematic approach to the study of human motivation encompassing not only the reasons for engagement in achievement tasks but how people define success (Pintrich, 2000). Therefore, an achievement goal approach offers insight relative to why some students seem engaged and approach physical activity whereas others seem disinterested and avoid physical activity.

There are a few key theoretical assumptions regarding an achievement goal approach. Achievement goal theory assumes the individual is actively involved in deciding and directing their achievement goal behavior and that their achievement behavior is a function of the personal meaning a person attaches to the outcome (perceived success or perceived failure) of the goal attainment (Duda & Hall, 2002; Roberts, 1992). Thus, it is assumed that the thought process to elect to invest in any activity, the effort exerted on the task, the persistence level shown when facing challenges, the product of that thought process, and emotional response comes from the

meaning that is attached to one's achievement striving (Duda & Hall, 2002). The personal meaning attached to one's achievement behavior or one's goal of action, therefore, must be understood to determine the individual's motivation in achievement settings. However, achievement goal theorists contend that there is not one goal of action but multiple goals of action directing individuals' behaviors (Roberts, 1992). The goal of action that the individual chooses then defines the process of why a person decides to approach or avoid certain activities or tasks with different levels of engagement, and different responses to achievement outcomes (Duda & Hall, 2002). Although there are many achievement goals possible, the classic achievement goal approach follows the hypotheses of Maehr and Nicholls (1980) that identified two specific achievement goals. These dispositional goals are referred to as task and ego goal orientation.

Working to define task and ego orientations, Nicholls (1984) argued that individuals adopt different goals of action and display different levels of effort based on how they view their competence in an activity or task. Task goal oriented individuals focus on the development of competence and believe that competence increases when proper effort is applied (Nicholls, 1989). Ego goal oriented individuals seek to demonstrate competence by outdoing others and effort is less likely to be an important cause of that success (Nicholls, 1989). Task oriented people, regardless of their perceived competence or ability level are hypothesized to choose moderate to difficult tasks, persist in the face of failure, and have enhanced task enjoyment while focusing on mastery of a task (Ames, 1992; Dweck & Leggett, 1988; Nicholls, 1989), whereas ego oriented individuals are hypothesized to believe that ability causes success and their perceptions of

ability are dependent upon how they compare to others in a similar achievement task (Duda, 1994). Ego oriented individuals with high perceived ability are hypothesized to respond with adaptive, yet rather tenuous, motivational patterns. Ego oriented individuals with low perceived ability are hypothesized to suffer motivationally. In general, ego oriented individuals are hypothesized to prefer easy over difficult tasks, provide minimal effort in the face of failure, and are less likely to report task enjoyment (Ames, 1992; Dweck & Leggett, 1988; Nicholls, 1989). In physical activity settings and especially in physical education settings, children and adolescents are often participating in front of their peers where their effort and ability are visible to others. Therefore, if individuals in physical education class are task oriented they would in theory be more active due to their focus on effort regardless of their perceived ability. On the other hand, ego oriented individuals in physical education class are hypothesized to result in low levels of physical activity when facing difficult tasks and higher physical activity levels during easy tasks due to their focus on their perceived ability and trying to protect their self-worth.

Task and ego goal orientations represent individual differences that are developed early in childhood as a result of cognitive maturation and socialization (Roberts, 2001). Nicholls (1984) argued dispositional goals are fully formed by about age 12. In other words, children after about the age of 12 are either inclined to be task oriented or ego oriented in their view of ability and effort in relation to how they perceive success in a particular achievement setting. Although most achievement goal theorists view goal orientations or dispositional goals as relatively stable for a particular task over time, they also view goal orientations as independent or orthogonal; thus a person can be high or

low in either task or ego orientation or both at the same time (Roberts, 2001). Some researchers have conceptualized and measured dispositional goals as dichotomous, arguing that in the end an individual is either more task oriented or ego oriented (Dweck & Leggett, 1988). Whether dispositional goals are measured as dichotomous or orthogonal, adopting a goal orientation is situation specific. Dispositional goals are not only still affected by an individual's perceptions of competence but also by the motivation characteristics of the situation. Also, researchers have argued that enhancing motivation may be easier by manipulating the climate or focusing on a leader's emphasis on goal orientations as opposed to attempting to changing goal orientations themselves (Biddle, 2001; Papaioannou et al., 2007).

Motivational Climate

Ames and Archer (1988) argued that a fundamental tenet of achievement goal theory is that the situation plays a vital role in the motivational process. Achievement goal orientations are assumed to be influenced by the situational demands present in the achievement setting (Maehr, 1984). The situation has the potential of making task and ego goals differentially salient across individuals and within an individual (Ames & Archer, 1988). In other words, the extent to which an individual adopts a task or ego orientation partially depends on how the individual views the motivational goal structure or motivational climate of the achievement setting. Although dispositional goals are rather impervious to change, extended experiences in a setting with a distinct motivational climate does influence motivational striving. Treasure and Roberts (2001)

noted that dispositional goals set an a priori pattern of motivational responding. The motivational climate can impact that pattern if it is particularly strong or an individual is highly invested in a particular setting for an extended period of time. Ames and Archer (1988) viewed the motivational climate as the student's perceptions of the classroom goals (i.e., perceived goal structure).

Ames and Archer (1988) identified that there are two over-arching dimensions of motivational climate. These were referred to as mastery (task-involving) and performance (ego-involving) climates. Mastery climates focus on improvement, working hard, learning something new, or showing progress and task competence in which effort and cooperation are supported (Ames & Archer, 1988). Performance climates are characterized by comparison and competition between peers in which a punishment oriented approach is utilized by coaches and teachers when mistakes are made by athletes or students (Ames & Archer, 1988). A mastery, but not performance, goal structure provides a learning environment that fosters long-term use of adaptive and appropriate learning strategies that is more challenging and engaging in which there is a belief that success is related to one's effort (Ames & Archer, 1988). Therefore, the instructors (e.g., coaches and physical educators) play a key role in the emphasis or promotion of a particular motivational climate.

Motivational climate has been examined in physical education research (Goudas & Biddle, 1994; Papaioannou, 1994; Papaioannou et al., 2007), but factors underlying the physical education setting are less clear (Papaioannou et al., 2007). Papaioannou (1994) and later Papaioannou and his colleagues (2007) argued that from a measurement

perspective, additional work was required to identify the factors underpinning mastery and performance climate in the physical education setting, which is discussed further in the measurement section of this literature review. However, it is clear that physical educators play an important role in not only the promotion of particular perceived motivational climate characteristics (e.g., perception of choice, teacher support, threat, and punishment for mistakes) but the teachers' role in emphasizing particular goals may be of equal importance in enhancing motivation for physical activity. Recently, achievement goal theorists (Elliot, 1999; Elliot & Church, 1997; Elliot & Harackiewicz, 1996) have argued for extensions in the achievement goal theory, which necessitates an overview of these new goal concepts because as the goals change so do the views of motivational climate or the teacher's emphasis on goals.

Recent Advances and Revisiting Motivational Goals

2 x 2 achievement goals. The widespread view of achievement goal models has been a dichotomous approach for both dispositional and situational goals. Goals were previously distinguished largely by how competence (i.e., self-referenced and normative) was defined (Roberts et al., 2007). Recently, Elliot and his colleagues argued that the dichotomous approach is limited conceptually and noted that experimental results have been equivocal. They suggested that our understanding of the motivational outcomes associated with task and ego dispositional and situational goals can be enhanced when the valence (i.e., approach and avoidance) of goals is considered in conjunction with the definition of competence (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). This

new approach and avoidance valence of competence is viewed as energizing the motivation process.

More specifically, approach and avoidance motivation is differentiated as a result of the function of valence. Valence refers to the degree the focal outcome is pleasant or not (Elliot, 1999). Approach motivation is when the individual is striving for competence and their behavior is initiated by a positive and a possible desirable event or outcome (Elliot, 1999). Conversely, avoidance motivation is striving away from incompetence and instigated by unpleasant outcomes or the possibility of an undesirable event or outcome. Conceptually Elliot (1999) proposed a 2 x 2 achievement goal paradigm in which dispositional goals (task and ego) are crossed with approach and avoidance tendencies. Again, this new approach is important to review because any changes to the achievement goal framework has the potential of altering researchers views of how to measure the perceived motivational climate or what goals the coaches and teachers are emphasizing in physical activity settings.

The 2 x 2 achievement goal framework comprises four distinct achievement goals: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. To date, research using this 2 x 2 achievement goal approach has found mastery-approach (equivalent to existing views of mastery or task goals) as adaptive in sport settings as it combines the most desirable definition of competence (self-referenced) with the more desirable valence (approach; Roberts et al., 2007). Research on performance-approach has been suboptimal with its definition of competence (normative) being undesirable but its valence (approach or striving for competence) as optimal

(Roberts et al., 2007). Similarly, mastery-avoidance that combines the desirable definition of competence with the suboptimal valence of striving (avoidance) has provided more mixed motivational results (Roberts et al., 2007). Lastly, performance-avoidance (equivalent to existing views of performance or ego goals), is hypothesized to combine both the undesirable definition of competence (normative) and suboptimal valence of striving (avoidance), has been linked to the most dysfunctional motivational outcomes (Roberts et al., 2007).

Although Elliot and his colleagues (e.g., Elliot, 1999; Elliot & Conroy, 2005; Elliot & Thrash, 2001, 2002) argued that the 2 x 2 model of achievement goals has resulted in both theoretical and empirical support, research on this model has been limited, especially in the physical education domain. Furthermore, valid and reliable assessments of 2 x 2 goals are not currently available. Therefore, this review focused on the trichotomous view (i.e., mastery, performance-approach, and performance-avoidance) of achievement goal theory that was proposed earlier because identifying teaching practices that promote mastery-avoidance is still vague (Papaioannou et al., 2007). The trichotomous goals approach is similarly limited in terms of research support in physical education but it does have credible conceptual underpinnings and a reliable and valid measure in the physical education domain.

Trichotomous achievement goals. Prior to the conceptualization of the 2 x 2 achievement goal extensions, Elliot and Harackiewicz (1996) initially revisited older views of the achievement goal approach and argued for an integration of classic and contemporary approaches. Elliot and Harackiewicz (1996) noted that a trichotomous

approach to achievement goals existed in the initial conceptions by achievement goal theorists incorporating the valence dimension of approach and avoidance (Elliot & Harackiewicz, 1996). In the early goal conceptualizations, individuals were viewed as either striving to attain competence or striving to avoid incompetence. As described by Elliot and Harackiewicz (1996), three types of achievement goals were initially posited by achievement goal theorists. These included a mastery or task goal focused more on an approach or development of competence, a performance or ego involvement goal aimed at avoiding demonstrating incompetence, and a performance or ego involvement goal focused on approaching or demonstrating competence. This original trichotomous view of achievement goals received little theoretical support, no empirical attention, and eventually was overlooked (Elliot & Harackiewicz, 1996). In the same article, Elliot and Harackiewicz (1996) provided evidence for the reintroduction of the approach/avoidance distinction by showing differential effects of the portioned performance goals on intrinsic motivation. Subsequently, Elliot and Harackiewicz (1996) provided empirical support for a trichotomous goals approach to achievement goal research that incorporated three goals: mastery goals, performance-approach goals, and performance-avoidance goals. Later, Papaioannou and his colleagues (2007) using the principle of compatibility developed a new perceived motivational climate scale for physical education settings to assess the teacher's emphasis on these three goals. This measure is discussed in detail in the next section of the literature review.

Within the trichotomous perspective, mastery goals paralleled existing views of mastery or task goals. Mastery goals focus on the approach or development of

competence in an activity or task. Mastery goals are considered to be an optimal achievement goal because they are hypothesized to entail striving to attain positive personal or task relevant possibilities. Mastery goals have been linked to adaptive motivational strivings such as attaining personal goals, intrinsic motivation, peak performance, and skill acquisition (Roberts et al., 2007).

A performance-approach goal oriented individual focuses on seeking favorable judgments regarding their competence on an activity or task. As mentioned previously, the performance-approach goal is hypothesized as suboptimal because it combines the desirable approach striving of competence but it also includes the less desirable normative definition of competence. Not surprisingly, previous research has found mixed results for performance-approach goals as being both adaptive and maladaptive to achievement settings. However, Roberts and his colleagues (2007) concluded that whether performance-approach goals tend to be adaptive or maladaptive in achievement settings depends largely on their perceptions of competence. If performance-approach individuals' perceptions of competence are high then the achievement outcome is predicted as adaptive in nature.

Performance-avoidance goal oriented individuals focus on not obtaining unfavorable judgments on their competence toward an activity or task (Elliot, 1999). As mentioned earlier, performance-avoidance is considered the most dysfunctional of the three goals. Performance-avoidance is hypothesized as equivalent to the existing performance or ego goal and it is equally maladaptive in achievement settings. Performance-avoidance goals are largely dysfunctional motivationally because they

combine the less desirable normative definition of competence with the less desirable avoidance striving of competence. Performance-avoidant individuals are hypothesized to be motivated extrinsically or amotivated and have increased concerns about losing a contest or to appear incompetent to others (Elliot, 1999). Again, explaining the conceptual definitions of each trichotomous goal is important because as the goal definitions are slightly altered (e.g., including valence of striving) and performance goals are teased out into two separate goals (i.e., performance-approach and performance-avoidance) the views of the perceived motivational climate and the teacher's emphasis on goals may be slightly altered as well.

Social approval goals. Adolescents may perceive a wide variety of reasons for trying to succeed in physical activity settings. For example, a person may believe that the purpose of performing well in physical activity settings is to demonstrate one's physical superiority over others or a person may simply just want to show that they learned something new. Another one of these many possible reasons for being motivated in physical activity may be socially driven. Some adolescents may believe that physical activity settings offer opportunities to be affiliated with others (e.g., being a part of a team), improve their social status (e.g., team captain), enhance their social relationships with their peers (e.g., peer or group acceptance and close friendships), or to gain approval from peers and adults or leaders. Understanding that social goals play an important role during adolescence, Maehr and Nicholls (1980) in the original achievement goal framework discussed the importance of social approval goals. However, social approval

goals were often omitted in research due to the ambiguity and vastness of social goals research (Papaioannou et al., 2007).

Social approval motivation within the specific motivational framework of achievement goal theory has been linked to the purpose of an individual's achievement striving (Urdan & Maehr, 1995). Maehr and Nicholls (1980) discussed how individuals define their success and perceived competence as being based on social approval that individuals showed behaviors that exhibited high effort, virtuous intent, and personal investment in an activity. In other words, Maehr and his colleagues assert that an individual's perceived social purpose of trying, or not trying, to achieve in an achievement setting as their social approval goal. Although there has been limited research on social approval goals and teachers' emphasis on social approval goals in physical education, one study did find social approval goals as defined by Maehr and Nicholls (1980) as being adaptive motivationally with a positive link to intrinsic motivation and satisfaction in physical education (Papaioannou et al., 2007). Therefore, obtaining adolescents' perceptions of social approval goals in the physical domain offers researchers, practitioners, and parents an additional source of information within the perceived motivational climate that is consistent with the achievement goal perspective in hopes for better understanding antecedents of physical activity behavior.

Caring

Many researchers in educational settings have emphasized the influential role the situation plays in student motivation but have largely omitted the role caring plays in

establishing an effective culture for learning (Noblit, 1993; Noddings, 1992). Therefore, traditional views of the psychological climate (e.g., mastery and performance motivational climates) might be a bit narrow in focus, especially in dynamic physical education contexts (Biddle, 2001; Newton, Fry, Watson et al. 2007). For instance, the motivational climate represents an individual's perception of the perceived goal structure in a particular environment represented by how effort and ability are emphasized, whereas caring is based on perceptions of interpersonal warmth and support (Newton, Fry, Watson et al. 2007). Educational theorists Noddings (1992) and Noblit (1993) have written extensively on the concept of caring and the critical importance caring plays in developing a classroom climate that produces effective pedagogy.

Traditional views of physical education classes in gymnasiums or out on the fields are often viewed as teachers using authoritative teaching styles to ensure effective management and to maximize time on task and physical activity time. Noblit (1993) argued that effective pedagogy is not a question of whether to use an authoritative or even a democratic approach but that there should be ethical use of power and minimizing the differences in power between teachers and students. Noblit (1993) thought caring was similar to power in that caring is relational and reciprocal with each benefiting and being committed to the other. In other words, power and caring are connected and there is a "toughness to caring" and the caregiver or instructor must be strong and courageous for it is their moral authority to do so.

Noddings (1992) viewed caring as being a fundamental human need in that people need to be understood, received, respected, and recognized. However, the

argument can be made that many families cannot meet the needs for caring with the social structural changes today (e.g., both parents working, and single family homes). Noddings (1992) argued that educational institutions must fill that need. Noddings (1992) broke down the concept of caring as a relation, connection, or encounter between two human beings. She went on to separate and define the roles in a caring interaction as either a person being the carer or the cared-for. The carer is described as being attentive and fully engrossed (nonjudgmental and fully attending to another) while also being motivationally displaced (unbiased free reception of another, empathetic, and priority for another's needs). The cared-for is viewed as being receptive, providing recognition, and responding. Noddings conceptualized the concept of caring as not being a virtue or an individual attribute but a connection centered on two people.

With regard to the physical domain or physical education settings, caring has been largely overlooked with the exception of Hellison (2003) who viewed caring as essential to engaging students in physical activity. Recently, Newton, Fry, Watson et al. (2007) defined a caring climate "as the extent to which individual's perceptions of a particular setting to be interpersonally inviting, safe, supportive and able to provide the experience of being valued and respected" (p. 72). Essentially, a caring climate captures the affective and relational elements between individuals that exist in the psychological climate and has also been shown to be adaptive towards physical activity in youth with increased enjoyment and a greater likelihood of future involvement in the youth programs (Newton, Watson, Gano-Overway et al. 2007). Assessing adolescents' perceptions of a caring climate provides additional insight on their perceptions of the perceived environment and

its contribution to understanding motivational antecedents of physical activity behavior. Further, the inclusion of a perceived caring climate as an additional source of information in the perceived physical activity environment created largely by adults prompts a more expansive understanding and representation of the motivational climate. Perhaps in the physical education setting, the term "perceived physical education climate" would better capture the characteristics in the situation that incorporate the four goal extensions (i.e., mastery, performance-approach, performance-avoidance, and social approval) as well as a perceived caring climate.

Summary

This section of the literature review focused on delineating achievement goal theory. Achievement goal theory offers insight into the understanding of not only the reasons for engagement or how people define success but also their interpretation of the characteristics evident in the perceived motivational climate. According to the goal orientation literature, individuals aim to display competence in achievement settings through the acceptance of two separate goals referred to as task and ego orientation. However, achievement goal theorists contend that salience of these two goals is influenced by the perceived characteristics of the situation or the perceived motivational climate created largely by adults. In academic settings, Ames and Archer (1988) identified mastery and performance climates as two over-arching dimensions of the perceived motivational climate. Mastery climate was associated with adaptive motivational outcomes whereas performance climates lead to more maladaptive

motivational outcomes. However, recent changes from the classic two-goal approach to a 2 x 2 goal or trichotomous goal approach (i.e., mastery, performance-approach, and performance-avoidance) has led to rethinking the conceptualization of the perceived motivational climate.

The 2 x 2 and trichotomous goal approaches are the same conceptually and theoretically with the latter approach omitting mastery-avoidance due to vague and limited research. The new extensions on achievement goals suggest that our understanding of motivational outcomes associated with the dispositional and situational goals can be enhanced when the valence (i.e., approach and avoidance) of goals is considered in conjunction with the definition of competence. Also, current research by Papaioannou and colleagues (2007) assessing the teacher's emphasis on the trichotomous goal approach argued for the revisiting and inclusion of a fourth goal referred to as social approval goals to tap into individuals' social purpose of trying, or not trying, to achieve in an achievement setting. Therefore, an expanded view of the perceived motivational climate was introduced by assessing the teacher's emphasis on the four achievement goals (i.e., mastery, performance-approach, performance-avoidance, and social approval). In addition, the role a caring climate plays within physical activity environments was also identified as important to understanding motivational antecedents of physical activity behavior. Further, the inclusion of a perceived caring climate as an additional source of information in the perceived environment created largely by adults prompted a more expansive term other than motivational climate. Instead, the term to refer to the

situational characteristics being assessed in this study was the perceived physical education climate.

Measurement Issues

Central to the empirical examination of any theory is the development of valid and reliable instruments. The second section of this literature review identified pertinent psychometric instruments related to the psychological climate and physical activity to make an argument for particular tools available in research today for assessing the psychological climate and physical activity in the physical domain. Climate measures that focused on the school, sport, and physical education setting were reviewed. This section also reviewed in depth the most recent motivational climate measure designed to assess the physical educator's emphasis on the trichotomous goals, social approval goals, and perceptions of a caring climate. Furthermore, this section reviewed the psychometric properties of the methods of assessing physical activity in physical education settings, more specifically, the validity and reliability of pedometers.

Motivational Climate

Introduction and background. The motivational climate or how people interpret the existing goal structure in physical activity settings created by leaders is widely believed to be a key to motivation in those settings. Over 2 decades of research on the motivational climate has led to the understanding that mastery climates are associated with adaptive motivational patterns, whereas performance climates are more likely to

lead to maladaptive motivational responses (Ntoumanis & Biddle, 1999). Our current knowledge is strongly dependent on the existence of reliable and effective tools to measure the perceived motivational climate.

Much of the initial research on the motivational climate and its measurement comes from the academic setting and the work of Ames (Ames, 1992; Ames & Archer, 1988). Breaking a trend of evidence linking goal orientations with specific motivational processes in laboratory settings, Ames and Archer (1988) went into classrooms with a specific set of questions to assess the characteristics of the classroom from the students' perspective. Individual student scores as opposed to the average score of the students were used to determine if the students differed in how they interpreted their experience in the same classrooms. Their findings led to the identification of two major theoretical distinctions of the students' subjective perceptions of the classroom's motivational climate. These two higher order factors were referred to as a mastery climate and performance climate in the classroom. The students overall perceived many different climate dimensions or classroom goals related to how they approached, engaged in, and responded to learning tasks. However, the students overall perceived their classroom goals as either with a mastery or performance goal emphasis. For instance, a few examples are the students' perceived success being defined through improvement (mastery) or high grades (performance), value placed on effort or high ability, satisfaction a result of hard work or doing better than others, teachers oriented toward learning or performing, and errors are a part of learning or elicit anxiety.

Although the early efforts by Ames (Ames, 1992; Ames & Archer, 1988) provided a theoretical and empirical springboard to further research on motivational climate, the findings and measurement tool was limited to the classroom setting. However, soon thereafter, goal perspectives researchers sought to determine the usefulness of examining similar dimensions of the motivational climate in the sport setting. Prior to the research by Seifriz and colleagues (1992) much of the sport domain research on goal perspectives focused on individual differences in dispositional goals and their affective, behavioral, and cognitive correlates.

Seifriz and colleagues (1992) aimed to replicate and extend upon the findings found in the classroom by Ames and Archer (1988) in the sport domain by creating an assessment of mastery and performance goal structures perceived by athletes on teams. The Perceived Motivational Climate in Sport Questionnaire (PMCSQ) developed by Seifriz and colleagues (1992) was the first questionnaire to measure mastery and performance climates in sport settings (Ntoumanis & Biddle, 1999). Seifriz and colleagues (1992) developed the questionnaire by either rewording relevant items within the Classroom Achievement Goals Questionnaire (Ames & Archer, 1988) or developing items on their own to be more relevant to the sport domain. The researchers used 105 American male high school varsity basketball players for the purposes of this study. Similarly to Ames and Archer's findings in the classrooms, exploratory factor analysis suggested two factors explained a preponderance of the variance in the data. Perceptions of a mastery climate comprised 9 items and 12 items loaded on a factor termed performance climate. The subscales displayed good internal consistency (both factors $\alpha >$

0.80) and good predictive validity. However, the PMCSQ was not tested using confirmatory factor analysis and other forms of validity (e.g., convergent and discriminant) and reliability (test-retest reliability) were not examined. In fact, later attempts to test the construct validity of the questionnaire by Walling, Duda, and Chi (1993) failed to show independence of mastery and performance climate constructs. Further, later studies (Ebbeck & Becker, 1994; Walling et al., 1993) found some peculiar findings using this measure of motivational climate in sport suggesting perhaps that a more comprehensive measure was needed to more fully capture motivational climate goal structures in sport. Walling and colleagues (1993) indicated that the PMCSQ could be improved and in particular, the PMCSQ could be strengthened by conceptualizing the motivational climate in a hierarchical manner to be more in line with Ames's (1992) conceptual framework. The hierarchical focus would be able to better inform researchers and coaches to the specific situational structures (e.g., type of evaluation present, amount of social-comparison present, the nature and source of rewards, and reinforcement) that were emphasized in the motivational climate over others. Shortly thereafter, a more hierarchically comprehensive, reliable, and valid PMCSQ-2 scale (Newton, Duda, & Yin, 2000) was created.

The Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2) developed by Newton and Duda (1993) provided a more comprehensive and multidimensional measure of the motivational climate. Newton and Duda (1993) based this questionnaire on previous academic and sport research on the motivational climate using 225 American female basketball and volleyball players. Exploratory factor analysis

resulted in a hierarchical structure with 30 items differentially loading on six lower-order factors that in turn loaded on two higher-order factors. The higher-order factor termed a mastery climate included the lower-order factors of effort/improvement, important role, and cooperative learning. The higher-order factor called a performance climate included the lower-order factors of unequal recognition, punishment for mistakes, and intrateam member rivalry. The PMCSQ-2 showed adequate internal reliability and predictive validity. In addition, confirmatory factor analysis revealed a better fit for a hierarchical structure of the PMCSQ-2 rather than a nonhierarchical structure or the two-scale PMCSQ measure. Newton and her colleagues (2000) also found concurrent validity of the PMCSQ-2. Perceptions of a mastery climate positively correlated with intrinsic motivation and perceptions of a performance climate negatively correlated with intrinsic motivation but positively related to pressure or tension.

Based on the theoretical and psychometric analysis of the PMCSQ-2, it would appear that the PMCSQ-2 is a reliable and valid tool for sport settings. However, the PMCSQ-2 is designed for the sport context and some of its factors (e.g., intrateam member rivalry) are not particularly meaningful in physical education. In addition, sport settings differ from physical education settings in terms of leadership (e.g., coach and physical educator), reasons for participation, variability in physical ability, and the social influences in operation. Thus, researchers have created questionnaires specific for measuring the goal structure in physical education.

Similar to the classroom and sport settings, the measures of the motivational climate in the physical education setting relied mostly on self-report questionnaires

(Goudas & Biddle, 1994; Goudas, Biddle, Fox, & Underwood, 1995; Mitchell, 1996; Papaioannou, 1994; Papaioannou et al., 2007; Solmon, 1996; Treasure, 1993). The first attempt by Papaioannou (1994) to create a measure of motivational climate in physical education largely focused on the work of Ames (1992) regarding classroom motivational climate. The Learning and Performance Orientations in Physical Education Classes Questionnaire (LAPOPECQ) was developed to measure Greek school physical education students' perceptions of learning and performance climates in physical education classes (Papaioannou, 1994). The LAPOPECQ revealed a hierarchical structure with two higher-order factors (mastery/learning-oriented and one performance-oriented) and 5 lower-order factors. Over the years, the LAPOPECQ has shown strong construct and predictive validities with acceptable internal consistency (Ntoumains & Biddle, 1999). Papaioannou (1995) provided evidence of predictive validity for the LAPOPECQ with students' perceptions of a high mastery/learning-orientation being linked to perceptions of high intrinsic motivation and low anxiety regardless of perceived competence. Conversely, students' perceptions of a performance climate led to low perceived competence and low levels of intrinsic motivation and more anxious due to low perceived competence than the students with high perceptions of competence. The LAPOPECQ has been shown to be a useful tool in assessing the motivational climate in physical education but the measure was designed to assess the dichotomous conception of motivational climate and not the recent trichotomous view of motivational climate. In addition, it should be noted that this questionnaire was developed for the Greek physical education setting.

Meanwhile, Goudas and Biddle (1994) attempted to not only create an English version of a motivational climate measure but one that had a broader conceptualization of the physical education climate. Goudas and Biddle's (1994) scale was called the Physical Education Class Climate Scale (PECCS) and was validated using 254 13-15-year-old middle school students in the United Kingdom. Analysis revealed two higher order factors (mastery and performance climate), with acceptable internal consistency, and predictive validity. However, Biddle and colleagues (1995) failed to show construct validity as the model failed to fit the data very well. It would appear that this scale requires further testing and cross-cultural validation as well. Further, this scale measures only mastery and performance climates and not the trichotomous view of motivational climate that may more fully capture the overall class climate in physical education settings.

Biddle and colleagues (1995) did not give up on their efforts to develop a motivational climate scale for physical education but instead of an English scale, they developed a French climate scale. The French scale was called L'Echelle de Perception du Climat Motivational' (EPCM; Perception of Motivational Climate Scale), that was just the French version of the PECCS. Reliability and validity results showed clear support for the EPCM with good internal consistency, predictive validity, and test-retest reliability but again this tool requires cross-cultural validation. In addition, the EPCM follows the classic view of motivational climate and not the recent and more inclusive trichotomous three goals approach.

Lastly, Mitchell (1996) developed the Physical Education Learning Environment Scale (PELES) using 622 American middle school students. However, the scale was not successfully validated and needs further testing before it can be considered a valid instrument (Ntoumains & Biddle, 1999). Later, Koka and Hein (2003) using German children reinvestigated the construct validity of the PELES through both exploratory and confirmatory factor analysis and found support for the construct validity of the PELES. However, Koka and Hein's results need to be validated cross culturally and as with the previous motivational climate measures for physical education, the PELES follows the classic view of motivational climate and not the recent trichotomous three goals approach.

Teacher's emphasis on trichotomous goals and social approval goals. Papaioannou and his colleagues (2007) recently developed a new instrument based largely on the trichotomous conceptualization of the motivational climate. The measure assesses the perceptions of the teacher's emphasis on mastery, performance-approach, performance-avoidance and also revisited and included social approval goals. Papaioannou and his colleagues (2007) created the Perceptions of Teacher's Emphasis on Goals Questionnaire (PTEGQ, Papaioannou et al., 2007) using 770 middle to lower socioeconomic class secondary Greek school students (379 males to 388 females) with a mean age of 13 (M = 13.86). The rationale behind creating this new motivational climate scale in physical education was to avoid the limitations of the previous sport and physical education motivational climate measures and develop a valid and reliable assessment tool for physical education that includes recent extensions in achievement goal literature. For

example, many of the previous motivational climate measures were not developed to be in line with Ames's multidimensional conceptualization of the perceived motivational climate dimensions (e.g., basis and type of evaluation present, the amount of social comparison present, and the nature and source of rewards and reinforcement). If the measures were in line with Ames's view of motivational climate, the measures were not suited for the physical education domain. Additionally, Papaioannou and his colleagues were interested in adding a measurement tool that could assess the recent adaptations to the goals structure but that included the teacher's emphasis on trichotomous goals and included social approval goals as well.

The PTEGQ focused on the role of the teacher in promoting achievement goals (i.e., mastery, performance-approach, performance-avoidance, social approval) because physical education teachers are most responsible for creating that climate. In fact, Papaioannou and his colleagues (2007), adopting the principle of compatibility, argued that researchers need two types of perceived motivational climate measures with one measuring the multifaceted characteristics of the motivational climate (e.g., classic motivational climate) and another that measures motivational climate perceptions that are more likely to activate achievement goals (e.g., PTEGQ).

The PTEGQ is a 24-item questionnaire that measures the students' perceptions of their teacher's emphasis on mastery goals, performance-approach goals, performance-avoidance goals, and social approval goals. The participants were asked to respond to the items using a 5-point Likert scale (1 = *strongly disagree* and 5 = *strongly agree*), with the stem "My physical education teacher" assessing teacher's emphasis on: mastery: "He/she

helps me in learning how to improve my abilities in games and exercises"; performance-approach: "He/she only praises students that look more capable than others in physical education"; performance-avoidance: "He/she makes me worry if they call me incapable in drills or games"; and social approval: "He/she likes me to learn new skills and games and to earn others love." A mean score was computed for each of the four goals. The PTEGQ was found to have adequate internal reliability (alpha above .80) for all scales. The PTEGQ was also found to have external construct validity, internal convergent and divergent validity, and discriminate validity (Papaioannou et al., 2007).

The findings in the scale validation study for the teachers' emphasis on four goals provided initial support for the measurement of students' perceptions of their class climate over 12 years of age. However, this study was validated with Greek children and further cross-cultural validation studies are required as with many of the previous measures before this one. The researchers did however translate the scale into English, while also indicating that the items indicating "love" were more appropriate for the Greek language and culture, in English, the verb "love" could be translated as "like" and the noun "love" could be translated as "approval".

Caring Climate

Thus far, the discussion has focused on the perceived motivational climate in physical education with a central emphasis on achievement related characteristics of the context or physical education setting. Over the past 2 decades, philosophers and researchers in academic settings have discussed the effect and importance of another

subjective student experience perceived to exist in a classroom climate often referred to as "caring." The concept and the impact of caring, however, has been difficult to conceptualize and to quantitatively assess.

Noddings (1992) conceptualized caring as a relation between two people with one being the carer and the other being the cared-for. Essentially, caring seems to capture what is often emphasized by educational professionals as being critical to developing a classroom environment that produces effective pedagogy. Caring captures the affective and relational elements between individuals and has been shown to be related to physical activity in youth (Newton, Watson, Gano-Overway et al. 2007). Hellison (2000) viewed caring as being crucial in promoting physical activity. Ennis (1999) viewed caring relationships as critical to grabbing and maintaining the attention of adolescents in academic settings. Physical education contexts might be a unique and appropriate setting to examine caring because of the large extent of emotionally laden interpersonal interactions that occur offering opportunities for caring between not only the teachers and students but between students as well (Larson, 2006).

Although caring remained philosophical in nature for many years, there have been a few attempts in academic settings to assess caring (Bulach, Brown, & Potter, 1998; Battistitch, Solomon, Watson, & Schaps, 1997; Larson, 2006). Bulach and colleagues (1998) developed a scale to assess teachers' behaviors that create a caring learning community. The instrument focused only on teacher behaviors and neglected the importance of other elements in the environment, such as student initiated caring. Battistich and colleagues (1997) also developed a questionnaire to assess caring but

within a broader concept of school as a community. The researchers' broad concept of school as a community was based on both perceptions of student autonomy, interpersonal support, as well as caring based items. The items were also not solely intended to identify caring behaviors in a particular context but focused on combining perceptions of the classroom and in the greater school setting to assess whether the students perceived the school as a community. Although the students' sense of a community within an academic setting was too broad to capture the theoretical and conceptual caring behaviors described by researchers, the research did provide some insight for future researchers attempting to create items to more specifically assess caring in a single context.

Later, Larson (2006) used a critical incident form to capture the essence of what students' perceived to be caring teachers. Overall, Larson's (2006) assessment tool was effective in eventually identifying three subcategories (i.e., recognize me, help me learn, and trust or respect me) describing caring teachers. These categories were in line with Noddings' (1992) conceptualization of caring behaviors that includes engrossment or attentive related characteristics. Later, Newton, Fry, Watson et al. (2007) stated that the findings in Larson's study provided evidence that students do perceive caring behaviors in physical education class and that creating a quantitative assessment tool of caring in the physical domain is possible and pertinent.

Newton, Fry, Watson et al. (2007) developed the Caring Climate Scale (CCS). The measure was created by experts in the physical domain based on their practical experiences working with youth and also focusing on theoretical and conceptual frameworks related to youth settings (Cohen, 2001; Hellison, 1995; Noddings, 1984,

1992, 1995). The scale captures not only whether participants perceive the leader to be caring but also whether caring is perceived between and among the participants themselves. The term caring climate was operationally defined as " the extent to which individuals perceive a particular setting to be interpersonally inviting, safe, supportive, and able to provide the experience of being valued and respected" (Newton, Fry, Watson et al. 2007, p. 70). Participants respond to items using a 5-point Likert scale (1 = *strongly disagree*, 3 = *not sure*, 5 = *strongly agree*), with the stem for each being "In [National Youth Sport Program], the leaders accept kids for who they are." A mean scale score is then computed. In developing and validating the CCS, Newton, Fry, Watson et al. (2007) performed two studies. Study One focused on the development of the CCS along with its factor structure and validity through exploratory factor analysis as well as its internal reliability. Study Two attempted to confirm the factor validity through confirmatory factor analysis while examining convergent validity of the CCS on two motivational variables (i.e., future anticipated involvement, and value of participation in the program) and discriminant validity on the two motivational climates (i.e., task-involving climate and ego-involving climate).

In Study One, the CCS was created using 214 preadolescent boys and 138 girls aged 9 to 17 (M = 12.18) with the majority being American multiethnic low-income youth from the same youth sport program (NYSP) at two different regions of the United States. Initially, experts created 30 items to assess a caring environment in physical activity settings. Following careful deliberation, the experts' eliminated 10 items to clarify and simplify the measure. Then, Newton, Fry, Watson et al. (2007) used a series

of exploratory factor analyses with a maximum likelihood method to identify factor validity in the scale that revealed a single factor solution containing 14 items, that they referred to as the caring climate. The revised 14-item measure was found to be an internally reliable single factor measure. Further, convergent and divergent validity also confirmed factorial validity. A positive relationship emerged between perceptions of a mastery climate and perceptions of a caring climate confirming convergent validity, whereas a negative relationship was found between perceptions of a performance climate and perceptions of a caring climate supporting divergent validity. Further, the moderate to low relationships suggested that perceived motivational climate and caring climate are also distinct and that a perceived caring climate provided unique contributions to the overall climate in the physical domain.

In Study Two, using 395 preadolescent girls and 197 boys aged 9 to 16 (M = 11.80) with the majority again being American multiethnic low-income youth from the same youth sport program (NYSP) in two different regions of the United States. Confirmatory factor analysis was found to produce an acceptable hypothesized model fit confirming a single factor structure of the original 14-item CCS used in Study One. However, further analysis of the model resulted in one item being eliminated. A positive link between a caring climate and future intention to participate in the program supported convergent validity of the 13-item CCS. In summation, the results of these two studies led to the caring climate scale being even further refined (from 14 items to 13 items) and supported as a single construct. Further, the caring climate scale was significantly and positively linked with future involvement in the program but not with valuing the

program. The findings in these two studies suggest that a caring climate is not only important but distinct from the motivational climate in physical activity settings. This additional insight may prove invaluable to better understanding the motivational process related to why individuals persist in physical activity programs.

Physical Activity

Methods of assessment.

Over the past 4 decades, there has been a tremendous amount of research regarding the benefits of regular physical activity (Welk, 2002). Although the health benefits associated with physical activity are well established, there is still a high prevalence of inactivity in the population (CDC, 2008). Further, there is an alarming increase in inactivity rates among adolescents. Researchers have attempted to address these trends by exploring various correlates and mediators of physical activity and examining models to predict physical activity. Other researchers have compared physical activity levels of different populations and time trends in physical activity (e.g., are students meeting the physical activity recommendation in a typical physical education class?). Lastly, researchers are attempting to intervene in real world settings to determine if particular interventions are useful in increasing physical activity or answer questions related to their levels of physical activity within those settings through questionnaires. However, answers to these questions are dependent on valid and reliable measures of physical activity.

Today, there are many ways to measure physical activity behavior (e.g., self-report, heart-rate monitors, doubly labeled water, indirect calorimetry, activity monitors,

and pedometers; Dale, Welk, & Mathews, 2002). A review article by LaPorte, Montoye, and Caspersen (1985) that to our knowledge has not been duplicated since, identified seven different methods and 30 different instruments to assess physical activity behavior. LaPorte and colleagues reviewed the reliability, validity, practicality, and the reactivity of the different measures and surmised that there are still many challenges facing assessment of physical activity today. Although the advantages and disadvantages associated with each method and instrument is beyond the scope of this review this subsection briefly discusses the different methods of assessing physical activity with a particular emphasis on the validity, reliability, practicality, and reactivity of pedometers.

Initially, physical activity was measured through self-reports, an umbrella term that includes physical activity diaries, questionnaires administered by researchers or self-administered by participants, and reports by parents (Sallis & Saelens, 2000). In a review article, Sallis and Saelens (2000) reported that self-reports do provide adequate reliability, content validity, and relative criterion validity for adolescent populations, adults, and older adults. However, despite adequate reliability and validity, self-reports do pose serious problems with subject recall of previous activity, especially with children. It is difficult for children to understand the differences between intensities of varying activities (Schneider et al., 2004). Thus, recently researchers have turned their attention to using objective monitors to assess physical activity, particularly in physical education.

A popular objective method to measuring physical activity intensity is the use of heart-rate monitors. Heart-rate monitors are able to directly provide the physiological

response caused by physical activity, while also providing information regarding intensity and duration of physical activity. However, assessing physical activity with heart-rate monitors is not without limitations. The physiological changes could be related to other causes unrelated to physical activity such as temperature, high humidity, hydration, mental state, and other demographic (e.g., age) variables. In addition, individual differences exist in relation to muscle contraction and muscle mass and these may differ in relation to the activity performed. Further, heart-rate monitors have been found to have time lag issues and all of these issues pose serious data interpretation problems (Dale et al., 2002).

Direct observation is another objective technique to measuring physical activity behavior that involves trained researchers or observers accurately describing physical activity behavior in a particular setting. However, the problem with direct observation is time related. The technique is not easy to learn and often requires many hours of training with no guarantee of reliability and validity between observers. Again, many studies require multiple activities with larger sample sizes that can be a challenge for this technique.

Indirect calorimetry and doubly labeled water techniques both provide very accurate information on energy expenditure during physical activity (Dale et al., 2002). Indirect calorimetry is a technique that uses respiratory gas analysis to accurately measure energy expenditure (Dale et al., 2002). An obvious disadvantage to this technique is the invasiveness of the measure by requiring participants to wear equipment over the mouth and face during activity time. Indirect calorimetry is more suited for a lab

setting. The doubly labeled water technique requires the participants to drink two isotopes of water and after a few weeks, the analysis provides a direct measure of carbon dioxide production and energy expenditure during physical activity. The disadvantage of this technique is the cost and availability of the isotope as well as the training required for the technique. Further, both of these techniques are better suited for studies in the lab setting and with smaller sample sizes.

Activity monitors, also known as accelerometers, provide an objective technique that has quickly become one of the most popular methods to measuring physical activity behavior (Dale et al., 2002). Activity monitors are defined by their electronic components that can assess acceleration of the body in multiple dimensions. One of the greatest advantages of activity monitors is the capability to differentiate between different activities' intensities. The data can also be easily downloaded for data processing. Many studies have validated accelerometers but the biggest and a very realistic drawback in today's economic climate is the expense of accelerometers. Accelerometers can range anywhere from $200 to $500 per unit, which severely hampers their availability to researchers dealing with larger sample sizes (Dale et al., 2002).

Pedometers are another objective method of assessing physical activity behavior that provide an alternative and more practical solution to the expensive activity monitors. Pedometers are typically worn on the waistband or the hip and detect or record steps taken by responding to vertical accelerations of the hip during gait cycles and can estimate distance traveled (Schneider et al., 2004). Pedometers have become increasingly popular in research as they have become an acceptable methodology to measure physical

activity (Schneider et al., 2004). Overall, pedometers are relatively inexpensive, unobtrusive (Bassett et al., 1996), and their output (step counts) is easily understandable (Schneider et al., 2004). Therefore, pedometers under the right conditions, unlike many of the aforementioned methods of measuring physical activity, can be very useful in research with large sample sizes. Pedometers are also useful for practical applications, such as comparing time trends in physical activity.

Pedometers however, are not without their own limitations. Pedometers only capture ambulatory movement and fail to measure physical activity when it does not involve gait cycles in the legs (e.g., weight lifting), activity in the water or with a bike. Further, pedometers cannot provide information regarding the intensity of the physical activity. There are also many pedometer models that vary in cost and may or may not be as reliable and valid as other pedometers. However, recent research by Schneider and colleagues (2004) provided some clarification regarding the different pedometer models in the commercial market today by comparing the step values of 13 pedometers. Their research provided other researchers with the confidence or a gold standard in choosing the most accurate and reliable pedometers.

Schneider and colleagues (2004) compared 13 pedometer models measuring free-living physical activity. The following 13 pedometers were assessed in the study: Accusplit Alliance 1510 (AC), Freestyle Pacer Pro (FR), Colorado on the Move (CO), Kenz Lifecorder (KZ), New-Lifestyles NL-2000 (NL), Omron HJ-105 (OM), Oregon Scientific PE316CA (OR), Sportline 330 (SL330) and 345 (SL345), WalkLife LS 2525 (WL), Yamax Skeletone EM-180 (SK), Yamax Digi-Walker SW-200 (YX200), and the

Yamax Digi-Walker SW-701 (YX701). The study included 10 male (M_{age} = 39.5) and 10 female (M_{age} = 43.3) participants. The Yamax SW-200 (YX200) was selected as the criterion pedometer in the study due to its strong results in previous validation studies. All of the participants wore the SW-200 on the left side of their bodies and the comparison model on the right side for a 24-hour period, except for sleeping and showering, and then they recorded their steps on a log sheet. Each participant was tested over 13 days so all 13 pedometers were compared. The results determined that there were no significant interactions or differences between pedometer model and gender. However, there were significant differences among the 13 pedometer models in comparison to the criterion pedometer (YX200). Five of the models (FR, AC, SK, CO, and SL345) were found to have significant negative differences from the criterion (YX200) suggesting they underestimated steps and three models (WL, OM, and OR) showed significantly positive differences suggesting overestimation in terms of steps in comparison to the criterion pedometer (YX200). Overall, Schneider and colleagues (2004) showed that there were differences between models in pedometers measuring free-living physical activity and five of the models provided similar steps-per-day as the criterion (YX200) and could be recommended as assessment tools for physical activity research.

Summary

In this section measurement issues were discussed at length in an attempt to highlight not only the most valid and reliable measures of the motivational and

psychological climate but also tools that incorporated the latest theoretical conceptualizations of the climate that are appropriate for use in the physical education setting. In addition, this section included an analysis of the methods of assessing physical activity in physical education.

Specifically, a brief historical perspective was provided in the assessment of the perceived goal structure beginning in the classroom with Ames and Archer's (1988) work identifying a dichotomous view of motivational climate. Later, researchers in the sport domain followed the work of Ames and Archer by developing first the PMCSQ (Seifriz et al., 1992), that was shown to have predictive validity issues and lacked multidimensionality compatibility consistent with Ames' (1992) view of the motivational climate. Soon thereafter, Newton and colleagues (1993) developed a valid and reliable PMCSQ-2 for the sport domain, which was a more comprehensive and a multidimensional tool in line with Ames' (1992) view of the perceived goal structure. However, the PMCSQ-2 was developed to assess the perceived motivational climate in sport and the emphasis in this review was on pertinent measures of motivational climate in physical education. Papaioannou and his colleagues (2007) argued that there are many contextual differences between the two domains such as leadership (e.g., coach and physical educator) and that some dimensions (e.g., intrateam rivalry) were not pertinent for the physical education climate. Thus, other researchers sought to develop valid and reliable measures that capture the characteristics inherent in the goal structure in physical education.

As with the sport setting, physical education relied largely on quantitative assessments (e.g., questionnaires) to assess the perceived motivational climate. The first attempt was by Papaioannou (1994) who developed a valid and reliable tool to measure the perceived motivational climate while using Greek participants called the LAPOPECQ. However, the LAPOPECQ, Goudas and Biddle's (1994) PECCS scale, Biddle and colleagues (1995) EPCM, and Mitchell's (1996) PELES scale all followed the classic dichotomous view of motivational climate and each required further analysis and cross-cultural validation. However, recently, Papaioannou and colleagues (2007) developed the PTEGQ that assesses the teacher's emphasis on the recent trichotomous goal approach to motivational climate and included a fourth goal (i.e., social approval) that was argued as being important within the physical education setting. The PTEGQ was found to be a valid and reliable measure with fairly strong predictive validity but the scale was validated with Greek participants. Although this scale required cross-cultural validation, the researchers did provide an English translation of the measure.

In an attempt to more fully capture the essence of the learning environment in achievement settings, caring measures were briefly discussed. It was noted that many researchers (Larson, 2006; Noddings, 1992) and practitioners (Hellison, 1995) viewed caring as essential to not only promote an effective culture for learning but to positively impact the learners' engagement in the activities or classes, schools or programs, and community overall. Despite Noddings (1992) perception that caring was not quantifiable, several researchers attempted to quantify caring in academic classrooms (Bulach et al., 1998), schools or community wide (Battistich et al., 1997), or in physical education

classes (Larson, 2006). Although each study provided valuable information with regard to caring behaviors each was not without limitations. However, the previous attempts to quantify caring behaviors did provide evidence that caring could be quantified. Recently, Newton, Fry, Watson et al. (2007) were able to fully capture the essence of a caring climate through a questionnaire that included individuals' perceptions of their leader's caring as well as the perceived caring within the larger social networks of a particular context. Exploratory and confirmatory factor analysis confirmed a single factor solution referred to as a caring climate. The CCS was found to be reliable and evidenced construct, convergent, and divergent validity.

Lastly, tools with the purpose of quantifying physical activity were discussed. It was noted that there are many ways to measure physical activity (e.g., self-reports, heart-rate monitors, doubly labeled water, indirect calorimetry, activity monitors, and pedometers). Each method had their distinct advantages and disadvantages to measuring physical activity. However, the selection of the most appropriate assessment tool was dependent on the characteristics (e.g., method, procedures, analysis, and setting) of the study to be performed. It was argued that pedometers offer unique benefits specific to researchers and physical educators in youth settings because they are relatively inexpensive, unobtrusive, and tend to be easy to read, record, and analyze while maintaining adequate reliability and validity. Schneider and colleagues (2004) showed that there are differences between models in pedometers measuring free-living physical activity but the YX200 and four others were shown to be effective and were recommended as assessment tools for physical activity research.

Relevant Literature

The aim of the third and final section is to present relevant literature addressing the motivational impact of different psychological climates in physical activity settings towards physical activity behavior as well as examine the role that potential mediators (i.e., self-efficacy and intrinsic motivation) may play between psychological climates and physical activity behavior. Specifically, this section begins with a review of relevant motivational literature related to the classic motivational climate in sport and then transitions to the motivational impact of the more current motivational climate approaches in physical education. Lastly, the motivational impact and the role of potential mediators (i.e., self-efficacy and intrinsic motivation) between the psychological climates and physical activity were reviewed.

Classic Motivational Climate and Motivation in Sport

Success and failure is critical when learning new skills and whether athletes decide to continue to approach or avoid competitive sports. Researchers have long attempted to better understand achievement behavior and the underlying cognitive process that either maximizes or undermines motivation. For the past 3 decades, a large number of studies have examined the dynamic process of motivation and the constructs that drive that process (Roberts et al., 2007). Researchers have examined motivational patterns through a social cognitive lens with a majority of the classic studies utilizing achievement goal theory (Roberts et al., 2007). Initially research focused on the influence of dispositional goals on motivational striving. Following the lead of Ames in educational

psychology, sport psychologists began to examine the impact of the setting on motivation.

Ames (1992) argued that student learning can be influenced by the teachers' different classroom climates or perceived goal structures (e.g., mastery and performance climates). Teachers play a pivotal role in creating an environment that is conducive for adaptive motivational outcomes through the teaching strategies they may employ in their classrooms (Ames & Archer, 1988). Some of these adaptive outcomes are that the students develop effective learning strategies, positive attitudes, belief that effort leads to success, and choose more challenging tasks, whereas maladaptive motivational outcomes may include negative attitudes and failure due to lack of ability (Ames & Archer, 1988). The perceived motivational climate seems to be a critical factor to enhance our understanding of motivation. Compelling theoretical arguments (e.g., Ames, 1992) and research findings in the academic domain (e.g., Ames & Archer, 1988) quickly led to researchers in the sport domain to explore similar goal structures on the ball fields created by their coaches and whether their perceptions of the climate led to similar motivational effects as in the classroom settings.

Overview in sport setting. Many studies have examined the influence of the motivational climate in sport on cognitive, affective, and behavioral striving. For the sake of clarity Ames' original terminology for the two primary motivational climates, mastery and performance, were used. Empirical research utilizing the PMCSQ (Kavussanu & Roberts, 1996; Petherick & Weigand, 2002; Seifriz et al., 1992; Walling et al., 1993)

consistently supported the existence of two distinct goal structures in sport settings, namely a mastery climate and a performance climate.

Overall, findings from studies utilizing the PMCSQ (Kavussanu & Roberts, 1996; Petherick & Weigand, 2002; Seifriz et al., 1992; Walling et al., 1999) reported consistent motivational findings across sports, age groups, and skill levels relative to the perceived motivational climate (Ames & Archer, 1988). For example, Seifriz and colleagues (1992) found male high school basketball athletes positively linked perceptions of a mastery climate to high levels of intrinsic interest, increased enjoyment and effort, whereas perceptions of a performance climate were positively linked to attributional beliefs of superiority over others leading to success. Similarly, Walling and colleagues (1993) studied the motivational responses of young international athletes. The findings indicated perceptions of a mastery climate were positively associated with team satisfaction and negatively related to performance worries. Conversely, athletes' perceptions of a performance climate were negatively related to team satisfaction and positively related to increasing worries. Kavussanu and Roberts (1996) reported similar motivational effects with students in beginning college tennis classes. Positive relationships between perceptions of a mastery climate and intrinsic motivation and self-efficacy were reported as well as between perceptions of performance climates and tension.

Overall, the empirical findings utilizing the PMCSQ revealed a pattern in the sport domain related to the motivational influences of the motivational climate. The findings from these studies (e.g., Kavussanu & Roberts, 1996; Seifriz et al., 1992; Walling et al., 1993) were important to indicate to coaches who are developing a

psychological climate to focus on effort and task mastery over the demonstration of superiority. This information could be invaluable to coaches because mastery climates are linked to greater team satisfaction and less worries to athlete success or failure in competitive sports.

Although the PMCSQ studies revealed fairly consistent motivational responses regarding the influence of the perceived motivational climate in sport, similarly consistent findings were not reported for self-efficacy or other self-related constructs (e.g., self-confidence and perceived competence; Ntoumanis & Biddle, 1999). Ntoumanis and Biddle (1999) suggested the scale might have been the cause of the inconsistent findings due to issues with scale validation. Walling and colleagues (1993) indicated that the PMCSQ could be improved by conceptualizing the motivational climate in a hierarchical manner to be more in line with Ames's (1992) conceptual framework. Shortly thereafter, a more comprehensive hierarchical, reliable, and valid PMCSQ-2 scale (Newton & Duda, 1993) was created. Next, the discussion turns to relevant literature and findings associated with the PMCSQ-2 studies in hopes of getting a clearer and more comprehensive indication of the influence of the motivational climate on athlete motivation.

The PMCSQ-2 studies (Kuczka & Treasure, 2005; Newton & Duda, 1993; Newton et al., 2000; Reinboth & Duda, 2004) were successful in identifying subscales nested within two independent motivational climates consistent with the theoretical views of Ames's (1992). Similarly, to the PMCSQ studies, the PMCSQ-2 studies also revealed consistent motivational findings of perceived motivational climate across sports, age

groups, and skill-levels. Perceptions of a mastery climate were positively associated with intrinsic motivation or enjoyment, whereas a perceived performance climate was identified as a major predictor of pressure or tension for college female volleyball players (Newton & Duda, 1999; Newton et al., 2000). Additional studies examined the influence of perceived motivational climate concerning cognitive motivational outcomes such as global self-esteem (Reinboth & Duda, 2004) and self-efficacy (Kuczka & Treasure, 2005). These studies found that perceptions of a mastery climate were a positive predictor of global self-esteem and self-efficacy, whereas perceptions of a performance climate were negatively linked with self-worth and self-efficacy. To summarize, the PMCSQ-2 studies identified the two higher order climates (i.e., mastery climate and performance climate) and provided consistent findings relative to motivational responses across sports, age groups, and skill-levels. Further, the PMCSQ-2 studies also provided coaches with additional information as to which structures perceived in the climate were more influential to their athletes' motivation than others (e.g., team rivalry).

In the sport setting, based on theoretical and psychometric analyses there appears to be support for the PMCSQ-2 scale as well as empirical support for the differential impact of the dichotomous view of motivational climate. Specifically, perceptions of a mastery climate were linked to more adaptive outcomes such as intrinsic motivation, enjoyment, and variables related to self-efficacy, self-worth, or perceived ability. Conversely, perceptions of a performance climate were negatively related or showed no link to the adaptive outcomes above and were positively linked with maladaptive outcomes (e.g., pressure or tension).

Initial efforts in physical education setting. Drawing on the work in the sport setting, many researchers began exploring whether the classic motivational climate findings could be generalized to the physical education setting. Much of the initial research resulted from European countries, such as Greece (Christodoulidis, Papaioannou, & Digelidis, 2001; Digelidis, Papaioannou, Laparidis, & Christodoulidis, 2003; Goudas, Biddle, & Fox, 1994; Hassandra et al., 2003; Marsh, Papaioannou, Martin, & Theodorakis, 2006; Papaioannou, 1994, 1995, 1998; Papaioannou & Goudas, 1999; Papaioannou, Marsh, & Theodorakis, 2006), Spain (Cecchini et al., 2001; Escarti & Gutierrez, 2001), Great Britain (Carpenter & Morgan, 1999; Morgan & Carpenter, 2002; Standage et al., 2003), France (Cury et al., 1996; Cury et al., 2002), Germany (Koka & Hein, 2003), some studies in the United States (Ferrer-Caja & Weiss, 2000; Mitchell, 1996; Solmon, 1996; Theeboom, De Knop, & Weiss; 1995; Treasure, 1997; Xiang, Lee, & Solmon, 1997; Xiang, McBride, & Solmon, 2003), and one recent article from Asia (Sproule et al., 2007). Consequently, several motivational climate measures were developed specifically for the purposes of physical education settings in those cultures. Although there were numerous questionnaires to assess students' perceptions of motivational climate in physical education most of the scales were based on Ames and Archer's (1988) assessment of motivational climate in the classroom as were the previous measures in the sport setting. Although some scales were more reliable and valid than others, measurement tools continued to evolve and are still being constructed today. In fact, due to the wide variety of scales used in the different studies from across different cultures, age groups, and genders, the motivational links and conclusions resulting from

the synthesis of this research in the physical education domain should be taken with caution.

A review of literature by Ntoumanis and Biddle (1999) summarized the relevant literature in the physical education domain on the classical motivational climate and its motivational correlates. Although additional studies followed the literature review, their findings were consistent with the extant literature in this area to date. The literature overall indicated more consistent positive support for perceptions of a mastery climate as opposed to perceptions of a performance climate. Perceptions of a mastery climate were related to adaptive motivational outcomes (e.g., positive attitudes toward the lesson and intrinsic motivation), whereas perceptions of performance climates tended to either have no effect or a negative effect (Biddle et al., 1995; Brunel, 1999; Cury et al., 1996; Escarti & Gutierrez, 2001; Ferrer-Caja & Weiss; 2000; Goudas & Biddle, 1994; Koka & Hein, 2003; Mitchell, 1996; Papaioannou, 1994, 1995, 1998; Sproule et al., 2007; Treasure, 1997). High perceptions of self-efficacy or related constructs (e.g., high perceived ability or competence) were also positively linked to perceptions of a mastery climate and small or no effect with regard to perceptions of a performance climate (Cury et al., 1996; Escarti & Gutierrez, 2001; Goudas & Biddle, 1994; Papaioannou et al., 1995, 1997). Furthermore, perceptions of a mastery climate were positively related to self-regulated behavior when considered in conjunction with perceived ability that was predictive of physical activity (Parish & Treasure, 2003), whereas perceptions of a performance climate led to more extrinsic and amotivated behavior and were unrelated to physical activity behavior (Parish & Treasure, 2003). Students in a mastery climate reported a

greater likelihood of future participation and enjoyment than in a performance climate (Lloyd & Fox, 1992; Solmon, 1996; Treasure & Roberts, 2001).

These findings in part were supported in intervention studies or studies manipulating the motivational climate (Cecchini et al., 2001; Hassandra et al., 2003; Solmon, 1996; Morgan & Carpenter, 2002) as well as the limited longitudinal studies (Christodoulidis et al., 2001; Digelidis et al., 2003). These consistent findings speak to the importance of physical educators creating and incorporating mastery climates into their physical education curriculum.

Recent Goal and Motivation Climate Extensions and Motivation

Moving from the classic mastery-performance dichotomy of motivational climate, this section summarized the relevant recent extensions of teacher's emphasis on four goals approach (i.e., mastery, performance-approach, performance-avoidance, and social approval goals) and caring climate within the physical domain. However, prior to that discussion, it is pertinent to state once again that the recent extensions of motivational climate stem from the recent changes in achievement goal perspectives beginning in the mid-1990s (Elliot, 1997; Elliot & Harackiewicz, 1996). Therefore, first a brief summary of the relevant literature focusing on the recent trichotomous goals and 2 x 2 goal extensions is reviewed.

Achievement goal extensions and motivation. The literature regarding further extensions of the achievement goal approach began with a pair of studies by Elliot and Harackiewicz (1996) that demonstrated differential effects for the two performance goal

manipulations (i.e., performance-approach and performance-avoidance) in predicting intrinsic motivation. In the first experiment there were 34 male and 54 female university undergraduates randomly assigned to one of four experimental conditions (i.e., Nina puzzles that involved finding the hidden word Nina a number of times throughout a drawing). Participants had to solve four Nina puzzles in one of four experimental conditions: performance-approach condition with a success diagnostic, performance-avoidance condition with a failure diagnostic, performance neutral with no diagnostic information, or a mastery goal condition. The results of the study revealed that performance goals in general did not undermine intrinsic motivation relative to the mastery goal but the performance-avoidance goal did have negative effects. In the same experiment, performance-approach goal participants reported intrinsic motivation similar to mastery goal participants that were significantly higher than performance-avoidance participants. Experiment 2 used nearly the same procedure as Experiment 1 and largely replicated the findings from Experiment 1 with performance-approach and mastery participants indicating greater levels of enjoyment on the task than performance-avoidance participants who reported less enjoyment of the Nina puzzles. Although this earlier study demonstrated that perhaps performance goals should be separated into separate approach/avoidance distinctions there were no self-report instruments available to assess the distinctions.

Later, Elliot and Church (1997) successfully demonstrated in a college undergraduate classroom setting that the two performance goals could be measured separately through a self-report measure that provided further support for the

trichotomous goal approach. Overall, there was strong empirical support for the trichotomous approach in achievement motivation. The data indicated mastery and performance-avoidance goals were consistent with previous research and straightforward. For example, mastery goal individuals' focused on attainment of competence and task mastery with achievement motivation leading to the possibility of success, whereas performance-avoidance goal oriented individuals' focused on the avoidance of negative outcomes and fear of failure being connected with the possibility of failure. Performance-approach goals seemed to be more complex than the two other goals that were associated with more mixed findings. For example, performance-approach goals were linked to high competence expectancy like mastery goals but positively associated with fear of failure like performance-avoidance goals. Elliot and Church indicated that performance-approach can be quite deceptive in achievement situations when there is a challenge and a threat present. In the end, Elliot and Church (1997) indicated clear support for the trichotomous goals approach. Overall, these findings suggest that mastery goals should be encouraged, performance-avoidance goals should be discouraged, and more research is required pertaining to performance-approach goals.

Even more recently, Elliot and McGregor (2001) further separated mastery goals into mastery-approach (positively approach success while focusing on learning a task) and mastery-avoidance (avoid making mistakes but focus on improvement or perfection). In a review of the recent 2 x 2 achievement goals by Roberts and colleagues (2007), the researchers surmised that both mastery-approach and mastery-avoidance goals were positively linked to intrinsic interest and positive self-perceptions (e.g., competence) but

mastery-avoidance was also linked to fear of failure and decreased interest if a threat to competence was perceived. Mastery-approach goals were linked to task mastery regardless of perceived competence. Similarly, as with the trichotomous goals approach research, performance-approach goals were found to be both adaptive and maladaptive (e.g., intrinsic motivation, high competence, and fear of failure), whereas performance-avoidance goals were linked consistently to undesirable antecedents and consequences (e.g., low intrinsic motivation and high anxiety, and low perceptions of competence; Roberts et al., 2007).

In summation, research on 2 x 2 climate goals provided support for the separation from the classic dichotomous goals approach. However, Roberts and colleagues (2007) pointed out that these findings should be interpreted with caution as the research is still in its infancy and measures identifying teaching practices that promote mastery-avoidance involvement are still vague. Additionally, there are concerns that students may not be able to distinguish between teaching practices that activate mastery-avoidance goals from teachers who activate performance-avoidance goals (Papaioannou et al., 2007). Overall, the trichotomous goals approach to achievement motivation potentially offers teachers additional information about the effects of teaching practices that support either mastery goals, performance-approach goals, or performance-avoidance goals. Although recent research found strong support for the trichotomous goals approach, research findings were limited to goal differentiation. Until Papaioannou and his colleagues (2007) research, there was no research examining the effects of the teacher's emphasis on the portioned goals in the physical education setting.

Teacher's emphasis on trichotomous goals and social approval goals in physical education. Papaioannou and his colleagues (2007) not only conducted research using the trichotomous goals approach in physical education but developed a reliable and valid measure to assess the perceived motivational climate in physical education settings for adolescents. The study involved 770 Greek middle school physical education students with there being nearly the same number of males as females in the sample (M_{age} = 13.80). The newly developed measure assessed the students' perceptions of the teacher's emphasis on mastery, performance-approach, performance-avoidance, and social approval goals. The researchers examined the predictive validity of the new measure by examining the relationships of the teacher's emphasis on four goals with intrinsic motivation, amotivation, and satisfaction in physical education. The research findings were consistent with previous motivational climate findings in physical education (Ntoumanis & Biddle, 1999). Mastery climate was positively correlated to intrinsic motivation and satisfaction in physical education. However, unexpected findings were noted, as perceptions of a performance-approach in particular did not have a positive impact on intrinsic motivation.

These findings were not expected as previous research findings on the separation of performance goals showed differentiated effects on intrinsic motivation (Elliot & Harackiewicz, 1996). For example, performance-approach goals in previous research were positively linked to intrinsic motivation along with mastery goals (Elliot & Harackiewicz, 1996). Papaioannou and his colleagues (2007) argued that these unexpected findings may simply have provided evidence that separating these two goals

may have little practical relevance for teachers and that perhaps the students could not differentiate between performance-approach and performance-avoidance teaching practices. The authors concluded that focusing on performance-approach goals likely promotes performance-avoidance goals as well. These findings further suggest that additional research is needed to clarify the predictability of the portioned performance goals in physical education research prior to making recommendations to physical educators in the schools.

The trichotomous achievement goal framework has provided much insight into achievement motivation in physical education contexts but adolescent students may also have social goals influencing their physical activity. For example, a student may decide to exert more effort if they feel their success is connected to the social approval of others. Again as mentioned earlier, Maehr and Nicholls (1980) initially viewed social goals as an additional achievement goal but again due to the ambiguity and vastness of social goals research social approval goals were omitted from the achievement goal framework (Papaioannou et al., 2007).

Recently in sport (Allen, 2003; Stuntz & Weiss, 2009) and physical education (Guan et al., 2006; Stuntz & Weiss, 2003) research on social goals has become more prevalent. Allen (2003) using female youth sport participants found that social motivation was an additional explanation to get involved in sport along with the participants' sport interest and enjoyment. Using high school physical education students Guan and colleagues (2006) assessed perceptions of trichotomous goals and social goals (i.e., social relationship, and social responsibility). The researchers found perceived persistence and

effort correlated positively with both mastery goals and social goals, whereas both performance-approach and performance-avoidance goals were related only to relationship goals. Further, mastery and social responsibility goals were the greatest contributors to perceived persistence and effort in physical education. However, researchers have argued that the use of social goals in these recent studies have been inconsistent with Maehr and Nicholls' original definition by combining social approval goals with ability goals (Papaioannou et al., 2007). The original definition linked social approval goals with effort and not ability (Urdan & Maehr, 1995). Maehr and his colleagues explained that those seeking to demonstrate commitment and faithfulness to others will consistently lead to high levels of effort. Stuntz and Weiss (2009) in sport and earlier in physical education (Stuntz & Weiss, 2003) examined links between three social orientations (i.e., friendship, group acceptance, and coach praise) and motivational outcomes. They found social orientations to be distinct from the classic dispositional goals (i.e., task and ego orientations) and social orientations as being predictive of intention to use unsportsmanlike play to seek approval from peers, greater enjoyment, and preference for challenging tasks. In fact, Papaioannou and colleagues (2007) included a similar conception of social orientation goals based on Maehr and Nicholls original conception of social approval goals within their new measure of perceived motivational climate in physical education referred to as social approval goals. They found support of social approval goals as not only being independent from the trichotomous goals but also being positively related to mastery goals, intrinsic motivation, and satisfaction in physical education.

Caring Climate and Physical Activity

Again, motivational concerns such as effort and ability are easily identifiable in a physical education environment due to the physical nature of the tasks (Biddle, 2001). Recent research, however, is providing increasingly more evidence that understanding adolescent motivation toward physical activity in the physical domain goes beyond determining student responses to the perceived goal structure. Researchers began exploring effective learning environments and found other important characteristics such as effective communication, support, warmth, closeness, and caring by the social agents or leaders making-up the psychological climate. Bulach and colleagues (1998) successfully assessed those teacher caring behaviors but did not measure the students' impact on each other in the overall classroom climate. Battistich and colleagues (1997) also attempted to quantify caring but within a broader concept of school as a community. As mentioned earlier, the researchers' broad concept of school as a community was based on both perceptions of student autonomy, interpersonal support, as well as caring items. Larson (2006) using a critical incident form to capture the essence of what students' perceived to be caring teachers identified three subcategories (i.e., recognize me, help me learn, and trust or respect me). The critical incident form described caring teachers that were in line and consistent with Noddings (1992) conceptualization of caring behavior namely that caring requires the student to perceive the teacher to display engrossment or attentive characteristics.

Although there was limited research in the past (Battistich et al., 1997; Bulach et al., 1998; Larson, 2006), the findings in these early studies suggested that the creation of

a quantitative tool to measure the role caring plays in establishing an effective culture for learning was not only feasible but critical to practitioners in the physical domain. Newton, Fry, Watson et al. (2007) sought to quantitatively assess a caring climate and examine the psychometric properties of the caring climate scale in two separate studies that were discussed earlier at greater length. Significant relationships were reported between a perceived caring climate and perceptions of a motivational climate. Perceptions of a caring climate were positively related to a mastery climate and negatively linked to a performance climate. Although the relationships were not large, it does suggest that the caring climate is distinct from a mastery climate. Perceptions of a caring climate were also found to positively predict future physical activity program involvement. In a different study Newton, Watson, Gano-Overway et al. (2007) found that youth participating in an NYSP program who perceived a caring climate reported greater empathetic concern for others and anticipated greater future involvement in the program. In addition, Brown and Fry (2009) assessed college-aged exercise participants who perceived a caring climate reported greater effort and commitment to exercise. Therefore, identifying and fostering leaders who have emotional intelligence and who purposively create an environment of caring is critical not only to promote future involvement or engagement in activities or programs but also developing morally aware individuals.

This level of moral consciousness or caring has also been promoted by Hellison (2000). In his Personal and Social Responsibility Model, caring for others in class or in physical education outside the classroom is suggested to be fundamentally important.

Lastly, promoting a climate of caring for others is also a key characteristic and goal in physical education settings being a part of the National Association for Sport and Physical Education Standard 5 curriculum guideline as well as most State Curriculum Guidelines. Therefore, the teacher's ability to develop a classroom atmosphere that is physically and psychologically safe appears vital to student engagement and the students' moral development in physical education (Magyar et al., 2007; Reeve & Jang, 2006).

Motivational Climate, Intrinsic Motivation, Self-Efficacy, and Physical Activity in Physical Education

Previous research supports the influence of the perceived motivational climate or the teacher's emphasis on goals and caring climate on cognitive and affective variables (e.g., self-efficacy and intrinsic motivation; Brown & Fry (2009); Elliot (1999); Gano-Overway et al., 2009; Newton, Watson, Gano-Overway et al. 2007; Ntoumanis & Biddle, 1999; Papaioannou, et al., 2007) as well as physical activity behaviors (Cury et al., 1996; Duda & Nicholls, 1992; Solmon, 1996) such as persistence or effort on a task. However, the influence of possible mediators is not as well known within physical education settings (Gao, 2008; Motl, et al., 2005). Based on the concept of triadic reciprocal determinism the influence of the environment on individual striving might be mediated by cognitive processing person centered variables such as self-efficacy and intrinsic motivation. Wittrock (1986) defined cognitive processes as an individual's thoughts or cognitions that impact learning with examples being their beliefs, perceptions, expectations, levels of motivation, and use of strategies. The next subsection addressed

the relevant mediation literature on the two cognitive processing variables (i.e., self-efficacy and intrinsic motivation) in relation to the physical education climate and physical activity related variables.

Self-efficacy and motivational climate in physical education. According to self-efficacy theory, achievement behavior of individuals can in part be explained and predicted by self-efficacy (Bandura, 1986, 1997). Self-efficacy represents an individual's belief in their capabilities to perform a behavior at designated levels and has been a consistent correlate of physical activity behavior among adolescents (Bandura, 1986, 1997). Consistently adolescent research has found that individuals who feel more efficacious are likely to expend more effort, perform better, and persist longer in sport and physical activity than those with low levels of self-efficacy (Feltz & Magyar, 2006; McAuley, 1992; Moritz et al., 2000). Additionally, self-efficacy or more general constructs related to perceived competence have been found to be a strong predictor of students' future participation intentions in physical activity and in future decisions about taking physical education (Gao et al., 2007; Xiang et al., 2004, 2005). These findings suggest that the individual variable self-efficacy has a consistently strong direct relationship with physical activity behavior (e.g., intention).

Previous research resulting from classic motivational climate literature points to a mastery climate as being adaptive relative to self-efficacy, whereas performance climates are considered maladaptive in terms of self-efficacy in sport and physical education settings (Cury et al., 1996; Escarti & Gutierrez, 2001; Kavussanu & Roberts, 1996; Kuczka & Treasure, 2005). Thus, self-efficacy has been found to be a correlate of the

climate and a predictor of physical activity. Somewhat surprisingly there is no research within the physical education domain examining the possibility that self-efficacy mediates the relationship between perceptions of the climate and behavior. The lack of self-efficacy mediation studies in physical education may be due to the powerful impact self-efficacy has in exercise settings. Researchers may have been focused on the predictive strength of efficacy and overlooked the possibility that efficacy might also be a mediating variable.

Researchers (Hein & Muur, 2004; Lee et al., 1992) have examined the mediational properties of other cognitive processing variables in student learning and performance settings. Hein and Muur (2004) measured cognitive processes (i.e., self-regulation, confidence-efficacy, attention-concentration, willingness to engage, and use of strategies) assessed by the CPQPE (Cognitive Processes Questionnaire in Physical Education; Solmon & Lee, 1997) to determine if the variables mediated the impact of the motivational climate on intention to be active in junior high school physical education. The researchers found to some extent that all of the cognitive processes mediated the relationship between the environment and the students' physical activity intentions. The strongest predictors were self-regulation, use of strategies, and willingness to engage in activities (similar construct to intrinsic motivation). Specifically, perceptions of a learning (i.e., mastery) climate influenced intention through making an effort and feeling enjoyment but self-regulation played a larger mediating role than the other mediators like confidence-efficacy.

In a 1-year prospective intervention study with 2840 middle school students, researchers studied the effects of commonly used mediators in previous studies (self-efficacy, attitude, social-support, perceived benefits, and barriers) to determine changes in physical activity that included programs with and without parental support. Positive changes in physical activity behavior in the adolescents were mostly explained by increases in self-efficacy for physical activity combined with parental support (Haerens et al., 2007). These recent findings suggest that self-efficacy could potentially be a mediating variable between the motivational climate and physical activity behavior but the findings are limited and more research is required incorporating the recent views of the psychological or motivational climate.

Intrinsic motivation and motivational climate in physical education. It has also been suggested that adolescents engage in sport and physical activity for enjoyment and intrinsic interest (Vallerand et al., 1987). Yet, physical education research studies in the United Kingdom (Van Wersch et al., 1992), Greece (Papaioannou, 1997), and in the United States (Mitchell, 1996) have reported that participation and interest in physical education gradually declines with age. Thus, currently there is consensus among researchers that intrinsic motivation is of central importance not only to physical education research but as an outcome variable in achievement goal research as well (Cury et al., 2002; Vallerand, 2007). In fact, intrinsic motivation has been one of the most widely studied concepts in physical education (Hassandra et al., 2003). Deci and Ryan (1985, 1991, 2000) have incorporated intrinsic motivation into their self-determination theory and defined intrinsic motivation as performing something for its own sake rather

than as a means to an end (i.e., extrinsic motivation). Other researchers have clarified the meaning of intrinsic motivation as internal motivation to experience pleasure or satisfaction while learning, exploring, or attempting to learn something novel (Vallerand et al., 1989). Intrinsic motivation is presumed to be influenced by an individual's perception of the motivational climate and positively affects one's subsequent persistence, satisfaction, and performance on a task (Cury et al., 2002; Kavussanu & Roberts, 1996).

Task-oriented goals and a mastery climate have both been conceptually (Nicholls, 1984, 1989) and empirically linked to intrinsic interest (Petherick & Weigand, 2002; Seifriz et al., 1992) whereas ego-oriented goals and a performance climate have been inversely related with intrinsic motivation (Duda et al., 1995). A vast majority of the research has employed the dichotomous view of the motivational climate (Ntoumanis & Biddle, 1999; Roberts et al., 2007). However, recently researchers have begun to assess the motivational climate through the recent extensions on achievement goals (e.g., trichotomous goals) as the teacher's emphasis on goals. As mentioned earlier, bifurcated performance goals have been found to have inconsistent effects on intrinsic interest suggesting that differentiation of the performance climate or a trichotomous goal approach may yield more consistent findings (Elliot & Harackiewicz, 1996). These inconsistencies continued in a recent study that examined intrinsic motivation and trichotomous goals (Papaioannou et al., 2007) in the physical education setting. These equivocal findings suggest further research is required in this area as well as with other

important goals and psychological climate variables of interest (e.g., social approval and caring climate).

A majority of the studies examining the mediating influence of intrinsic motivation in the relationship of the motivational climate and physical activity behavior have used causal designs as opposed to mediational analysis (Cecchini et al., 2001; Cury et al., 1996; Escarti & Gutierrez; Ferrer-Caja & Weiss, 2000; Sproule et al., 2007; Standage et al., 2003). Causal designs provide insight into the relationships between the variables but mediation analysis helps researchers determine direct and indirect influences on the outcome variable as well as whether the mediators are critical to influencing change in the outcome variable or not. Further, multiple mediation analyses may provide insight as to which cognitive processing variables (e.g., self-efficacy and/or intrinsic motivation) offers the best explanation regarding the impact of the perceived physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) and physical activity behavior.

In summation, intrinsic motivation is a critical variable to assess not only in mediation but in any facet within research designs. Intrinsic motivation is of particular interest to physical educators not only due to the rising inactivity rates as students mature and move into adulthood but also because intrinsic motivation or enjoyment in a task is a central variable in Standard 6 of the National Association of Sport and Physical Education (NASPE) as well as in most state physical education curriculum requirements. Intrinsic motivation is viewed by physical education professionals as being the key variable in promoting life-long fitness throughout adulthood.

Motivational climate and physical activity in physical education. Operational definitions in physical activity research have varied greatly (Nahas et al., 2003). To avoid confusion, the current review refers to physical activity as any bodily movement resulting in a step-count measured by a pedometer as a result of expended energy (Caspersen et al., 1985). Very few studies (Gao et al., 2007; Morgan et al., 2008; Trost et al., 1999) examining motivational determinants of physical activity in physical education have attempted to directly and objectively measure physical activity. Instead researchers have used self-reports to capture behavioral terms such as effort, performance, persistence, or intentions to engage in future activities or tasks to suggest physical activity behavior change.

In general, physical activity related research (e.g., studies incorporating self-report assessments of effort and persistence as motivational responses) has shown that participants in mastery climates reported greater effort (Duda & Nicholls, 1992; Solmon, 1996) and performance (Sarrazin et al., 2002) than participants perceiving performance climates. The teacher's ability to develop a classroom atmosphere that is physically and psychologically safe also appears vital to student engagement in physical education (Magyar et al., 2007; Reeve & Jang, 2006). In addition, Brown and Fry (2009) indicated that college-aged exercise participants who perceived a caring climate reported greater effort and commitment to physical activity. Recently, Papaioannou and his colleagues (2007) reported a positive relationship between students' perceptions of a teacher's emphasis on mastery and social approval goals to satisfaction in physical education (Papaioannou et al., 2007). However, the same study yielded mixed findings regarding

the link between a teacher's emphasis on performance goals with satisfaction in physical education. Cognitive processes (perceived ability) possibly may have influenced these findings. Again, these differential findings regarding perceived ability point to possible relevance of self-efficacy as a mediational variable between the perceived physical education climate and physical activity. Self-efficacy has been found to be a strong predictor of physical activity behavior (Bandura, 1997; Gao, 2007, 2008; Trost et al., 1999; Xiang et al., 2004, 2005). Lastly, intrinsic motivation has also been found as a strong correlate of physical activity behavior (Vallerand, 2007).

In the end, due to the large number of studies and significant relationships with physical activity, the research overall indicates that self-efficacy and intrinsic motivation may influence physical activity in physical education, possibly even more so than the perceived physical education climate. However, examining the impact of the possible mediation of self-efficacy and intrinsic motivation between the perceived psychological climate and physical activity may provide further insight as to how to foster physical activity either directly through the perceived physical education climate variables (i.e., teacher's emphasis on mastery goals, performance-approach goals, social approval goals, and caring climate) or by enhancing self-efficacy or intrinsic motivation directly.

Summary

Over the past 2 decades, achievement goal perspective has become the predominant approach to understanding achievement motivation. This review began with the theoretical background of the classic conceptualization of achievement goal

perspectives and later introduced recent extensions of the motivational climate (i.e., trichotomous goal approach) and additional factors that are potentially components of the overall classroom climate or the perceived physical education climate (i.e., teacher's emphasis on mastery goals, performance-approach goals, performance-avoidance goals, social approval goals, and caring climate).

The second section of the literature review discussed measurement issues. Instruments in the physical arena assessing classic motivational climate constructs, more recent motivational climate constructs, and caring were reviewed. Finally, the review of literature discussed relevant literature specific to the classic motivational climate and the teacher's emphasis on goals while emphasizing studies that focused on the influence of relevant individual variables (i.e., self-efficacy and intrinsic motivation) regarding the relationship between the motivational climate and physical activity behavior in physical education.

Overall, the relevant literature examining goals in the physical domain have strongly demonstrated the correlates and consequences of adopting mastery goals versus performance goals. Further, research on the mastery-performance climate dichotomy has consistently linked perceptions of a mastery climate with individual variables (i.e., self-efficacy and intrinsic motivation) that in turn could positively influence physical activity. Conversely, perceptions of a performance climate tend to be related to low levels of self-efficacy and intrinsic motivation as well as heightened extrinsic motivation and amotivation. Such outcomes are considered maladaptive outcomes in relation to physical activity behavior (Roberts et al., 2007). Similar results were found with classic

motivational climate in physical education with mastery climate being more advantageous (e.g., positive attitudes toward the lesson, intrinsic motivation, and enhanced physical activity) and performance climate undermining learning (e.g., extrinsic motivation and amotivation) or having little to no effect to motivation and physical activity (Ntoumanis & Biddle, 1999; Parish & Treasure, 2003). These findings were similar in intervention or manipulated motivational climate studies as well as longitudinal studies in physical education.

Current motivational climates (e.g., a teacher's emphasis on trichotomous goals approach) differ from the classic or dichotomous approach to the motivational climate. Recent trichotomous goals research findings provide support for the trichotomous goals approach suggesting that performance goals should be separated due to differential effects found with intrinsic motivation with regards to performance-approach and performance-avoidance goals whereas performance goals alone had no effect on intrinsic motivation (Elliot & Harackiewicz, 1996). Also, performance-avoidance goals appear to undermine intrinsic motivation, whereas both mastery and performance-approach foster intrinsic motivation. However, recent research by Papaioannou and colleagues (2007) reported contradictory findings that support the need for further research in this area.

Conceptually it makes logical sense that classroom climate made up of the teacher's emphasis on goals (i.e., trichotomous goals and social approval) should also include students' perceptions of a caring climate because characteristics that make up a caring climate can add to the knowledge of what is transpiring in the overall learning atmosphere. Recent research did find support that participants perceiving a caring climate

were more likely to be engaged in an activity or task, provide greater effort, and commitment to physical activity (Brown & Fry, 2009; Magyar et al., 2007; Reeve & Jang, 2006) but there has been limited research in the physical domain and none to date in physical education.

This literature review also covered relevant research that has examined self-efficacy and intrinsic motivation as individual predictors and as mediators of physical activity. Self-efficacy (e.g., Bandura, 1997; Gao et al., 2007) and intrinsic motivation (e.g., Vallerand, 2007) have both been found to be strong correlates of the perceived psychological climate and physical activity. Overall, the consistent correlations between the perceived psychological climate and physical activity to self-efficacy and intrinsic motivation suggest self-efficacy and intrinsic motivation may best be incorporated into an integrated model as mediators between physical education climate and physical activity.

In conclusion, this review of relevant literature began by discussing the importance of understanding the dynamic process referred to as motivation in order to determine why individuals are motivated to either approach or avoid achievement situations, causing some individuals to become disinterested in physical activity across domains (e.g., sport and physical education). Motivation seems to be linked to achievement goals that are largely influenced by perceptions of the psychological climate created by the leaders or social agents (coaches and/or teachers) in particular settings. Thus, the review of relevant literature summarized the findings of the classic motivational climate. Perceived mastery climates were found to lead to more adaptive motivational responses (e.g., effective learning strategies, positive attitudes, beliefs that

effort leads to success, and choosing more challenging tasks), whereas perceived performance climates lead to more maladaptive motivational responses (e.g., negative attitudes, failure due to lack of ability, and increased tension or performance worries).

More recent articulations of the perceived physical education climate (e.g., mastery, performance-approach, performance-avoidance, social approval, and caring climate) have proved equivocal for some goal structures (i.e., performance-approach) and positive for other goal and climate structures (i.e., social approval and caring climate). The literature for the individual variables (i.e., self-efficacy and intrinsic motivation) revealed positive and strong relationships for physical activity behavior. However, the potential meditational impact of these key cognitive processing variables between the psychological climate and physical activity behavior remains largely unknown in physical education settings and more research is needed.

CHAPTER 3

METHOD

This chapter identifies and elaborates on the participants, research design, procedures, specific measures, and the analysis that was employed in this study.

Participants

The participants were recruited from two junior high schools (three classes from each school) in the Southwest Region of the United States during the Fall of 2008 that included 4 physical educators, a male and female at each respective school. The participants in this study included 275 adolescents between the ages of 12 and 15 years. The mean age of the participants was 13.22 (*SD* = 0.85), and the sample consisted of 21.5% seventh-grade, 45.1% eighth-grade, and 33.5% ninth-grade students. The sample was comprised of a nearly equal proportion of males (*n* = 138) and females (*n* = 137). Ethnic backgrounds of the participants were 68% Caucasian/White, 9.1% Latin/Hispanic/Mexican American, 2.9% Asian American, 1.8% Pacific Islander, 1.8% Native American, 1.1% African American, 1.5% Multicultural, and 13.8% failed to identify. The participants were also asked to report the number of years they were taught by their current physical educator. Nearly half (42.2%) indicated that this was their 1st

year with the teacher, 36.4% indicated that this was their 2nd year, 19.3% indicated that this was their 3rd year, and 2.2% did not report this information. See Table 1 for additional demographic information.

Prospective Study Design

This was a semester long prospective study design aimed at determining whether perceived self-efficacy and intrinsic motivation mediate the relationship between adolescents' perceptions of their physical education climate (i.e., teacher's emphasis on four goals and caring climate) and their subsequent physical activity (pedometer calculating average steps per minute). Specifically, the students' perceptions of the teacher's emphasis on goals and caring climate was assessed early in the semester (Time 1) at least 1 month after the start of the Fall semester to allow ample time for the class climate to be developed by the physical educators and for the class climate to be perceived by the students. Then after approximately 1 month elapsed since the prior visit (Time 2), the researchers assessed the students' perceptions of their self-efficacy and intrinsic motivation towards basketball, followed by the assessment of the students' physical activity.

Procedures

The participants were selected through convenience sampling. Only the students in the physical education classes of the physical educators who agreed to participate in the study had the opportunity to participate. In addition to obtaining permission from the

Table 1

Demographic Characteristics

Variable	*n*	*%*
Gender		
Males	138	50.2
Females	137	49.8
Race		
Caucasian/White	187	68.0
Latin/Hispanic/Mexican American	25	9.1
Asian American	8	2.9
Pacific Islander	5	1.8
Native American	5	1.8
African American	3	1.1
Multicultural	4	1.5
Unidentified	38	13.8
Age		
Twelve	49	17.8
Thirteen	107	38.9
Fourteen	98	35.6
Fifteen	19	6.9
Unidentified	2	0.7
Grade		
Seventh	59	21.5
Eighth	124	45.1
Ninth	92	33.5
Years Taught by Teacher		
One	116	42.2
Two	100	36.4
Three	53	19.3
Unidentified	6	2.2

Note. Age (M = 13.32, SD = 0.85).

physical educators themselves, permission was obtained by the school district as well as from the University's Internal Review Board for Human's Subjects Research.

Once permission was granted, and prior to collection of data, the physical educators (n = 4) agreeing to be involved in the study were asked to teach basketball for approximately 1 month during the scheduled data collection period for each school (n = 2; see Figure 2 procedural timeline). Basketball was the activity of choice by the researcher because basketball is a familiar game for the majority of the students in their classes. The physical educators were informed that the main researcher would arrive the 1st and last week of the basketball unit, consistent with the prospective study design. The physical educators were also provided with a 30-minute lesson plan (see Appendix A) to be implemented only during the physical activity measurement days on the second visit as well as during the last week of the unit. The lesson plan was implemented in an effort to keep the lessons consistent between schools and in an attempt to control for teacher effects in the study. The lesson plan was designed to be consistent with basketball instruction for junior high school physical education. The lesson plan did not ask the physical educators to alter their teaching style (possible limitation or confounding effect) but to teach the same basketball skills (dribbling and free-throw shooting) and follow the same game play activity (3 on 3 or 5 on 5 basketball play depending on gym space and number of students) to be consistent between physical educators and in measuring physical activity step counts for Time 2. For instance, the lesson plan outlined the different phases of the lesson to be taught in sequence with specific time constraints (5-minute warm-up), instruction and skill practice (5 minutes dribbling and 5 minutes of

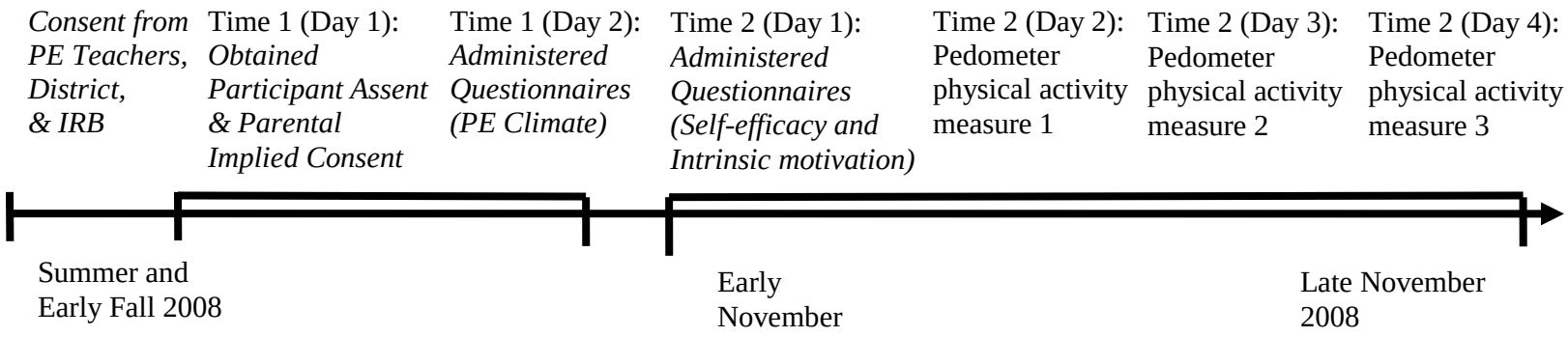


Figure 2. Procedural timeline.

free-throw shooting), game play (10 minutes 3 vs. 3 or 5 vs. 5), and data entry followed by bring the lesson to a close (5 minutes).

Time 1 (early Fall 2008 semester) consisted of 2 days to complete all data collection and Time 2 (late Fall 2008 semester) comprised of 4 days to complete all data collection. All of the procedures of this study took place in the respective school gymnasiums. The physical educators were only present for the physical activity portion of class on measurement days. They were asked not to be present during the data collection portions of the study. In greater detail, during Time 1 (Day 1) the main researcher explained the basic procedures, assent form (see Appendix B), and parental information letter (see Appendix C) to the students who were deciding whether to agree to participate in the study. The students had an opportunity to ask any questions regarding the study and their possible participation in the study. The students were then asked that if they did wish to participate in the study to read and sign the assent form and to bring home the parental information letter to their parent/guardian(s). The parental information letter explained the purposes and procedures of the study and provided contact information for the main researcher. If the parent/guardian did not want their child to participate, he/she could contact the main researcher. Participation in this study was voluntary and if for any reason any participant wished to opt out of the study, they were permitted to do so at any time.

Time 1 (Day 2), the researchers assigned identification (ID) numbers to the last names of the students' who both agreed to participate in the study and did not have a parent object to their participation in the study. The last names were written on large

posters that were placed in a convenient location for the students to view in the gymnasium. After identifying their ID numbers, the students matched their ID numbers to an envelope that was placed on the corner of the gymnasium. Each envelope had a questionnaire packet in it that included both the demographic questions as well as the teacher's emphasis on goals and caring climate questionnaires. The researcher then administered the questionnaires by reading each question aloud. Completion of the questionnaire took approximately 20 minutes. Following completion of the questionnaire, the physical educator returned and led the class through the 1st week of the basketball unit.

The researcher returned to each school approximately 1 month after Time 1 to complete the second phase of the study and to allow sufficient time to elapse between assessments. The researcher collected data on Time 2 for 4 days at each school for each class period. Day 1 involved self-reports of the mediators (i.e., self-efficacy and intrinsic motivation) whereas Days 2 through 4 involved assessment of the participants' physical activity levels measured by pedometers. Days 2 through 4 were taught by their physical educators who used the lesson plan provided by the researcher to structure their instruction.

More specifically, Time 2 (Day 1) followed the same procedures as Time 1 (Day 2) except that there was now a refresher for the participants in locating their proper IDs for the matching envelopes. The researcher administered the questionnaires without the physical educators present but the envelopes now included only questions related to the participants' perceptions of self-efficacy and intrinsic motivation towards basketball.

Again, the questionnaires took no longer than 20 minutes to complete. Those students who did not want to participate in the study continued with their regular physical education class as usual in a different portion of the gymnasium.

Time 2 (Day 2), the researchers again went over the procedures of first identifying the appropriate ID number and second identifying the matching folder to the ID number. The envelopes were again placed in a corner of the gymnasium as to not interfere with the class but this time each envelope had a pedometer (step-counter) on it with the same ID number marked on the device. Following the students obtaining the appropriate pedometer, the researcher then provided instructions on the proper placement, usage, and rules for the pedometers. After the pedometer instructions were given and placed in proper position (right side of their belt or waistband and in the midline of the thigh), the students understood not to touch the pedometers. The researcher then started the stopwatch and blew the whistle to signify to the physical educator to start the lesson according to the lesson plan that was previously provided. The students wore the pedometers from the start of the lesson until the end of the structured lesson plan for a total of 25 minutes, except in one class session that lasted 20 minutes due to uncontrollable circumstances (class ended early due to athletics taking over the gymnasium). The researcher monitored the total elapsed time with a stopwatch and at the end of each phase of the lesson the researcher instructed the physical educator to transition into the next phase of the lesson until all phases of the lesson were completed. At the end of game play, 25 minutes after initiating the lesson plan the researcher blew the whistle and instructed the participants to open their pedometers and write down their

step count on their individual folder. Following the recording of the participants' step counts for the activity, they were instructed to leave the pedometer on the folder matching their ID number. Then, the researcher double-checked the recorded scores and reset the pedometers and repeated the same process on Days 3 and 4.

Measures

A demographic questionnaire, four self-report measures, and one objective measure were used in this study (see Appendix D for questionnaires). Participants were asked to complete a demographic information sheet and questionnaires designed to assess the students' perceptions of the teacher's emphasis on goals (i.e., mastery, performance-approach, performance-avoidance, and social approval), caring climate, self-efficacy, and intrinsic motivation. Questionnaires were selected based on literature supporting their reliability and validity, as well as recommendations from other researchers in the field. Lastly, pedometers were used to objectively assess the students' physical activity.

Demographics

The participants were asked to provide their gender, race/ethnicity, age, grade, and the number of years the student had been taught by their current physical educator.

Motivational Climate (Teachers Emphasis on Goals)

Perceptions of Teacher's Emphasis on Goals Questionnaire (PTEGQ, Papaioannou et al., 2007) is a 24-item questionnaire that measures students' perceptions

of their teacher's emphasis on mastery goals, performance-approach goals, performance-avoidance goals, and social approval goals. The PTEGQ was modified slightly for proper English grammar in this study due to potential problems with readability as the scale was translated from Greek to English in the original study. The participants responded to the items on a 5-point Likert scale (1 = *strongly disagree* and 5 = *strongly agree*). The questionnaire asked how the person felt about their teacher with a stem on the questionnaire being "My physical education teacher." Example items with the slight adaptations were as follows: Mastery: "He/she helps me in learning how to improve my abilities in games and exercises" was slightly changed to "He/she helps me [learn] how to improve my abilities in [PE] games and exercises"; Performance-approach: "He/she only praises students that look more capable than others in physical education" was slightly changed to "He/she only praises students that look [like they are better] than others in [PE]"; Performance-avoidance: "He/she makes me worry if they call me incapable in drills or games" was slightly changed to "He/she makes me worry if [he/she says I am not good] in [PE] drills or games"; and Social approval: "He/she likes me to learn new skills and games and to earn others' [approval]" was slightly changed to "He/she [wants] me to learn new [PE] skills and games [so that others like me]." A mean score was computed for each of the four goals. Previous research on the PTEGQ established adequate reliability for all scales as well as confirmatory factor analysis support of a four-factor structure (mastery, performance-avoidance, performance-approach, and social approval) (Papaioannou et al., 2007). The same study also established discriminant validity for the PTEGQ as the climate subscales were found to be distinct from goals subscales

(Papaioannou et al., 2007). However, it should be noted that reliability and validity are specific to a situation and population and additional work may be needed not just in the translation of the items but also specific to the United States culture.

Caring Climate

The Caring Climate Scale (CCS, Newton, Fry, Watson et al. 2007) is a 13-item questionnaire that measures the extent to which the adolescents feel the social and interpersonal context is caring (Newton, Fry, Watson et al. 2007). The CCS was modified slightly from the sport context to pertain to the physical education context. The participants responded to the items using a 5-point Likert scale (1 = *strongly disagree,* 3 = *not sure,* 5 = *strongly agree*). The original item stem, "In NYSP" was altered to be, "In my PE class." Individual items that referred to "The leaders" were changed to "My PE teacher" and items that were singular [respect] were changed to plural [respects] to better characterize the PE setting. For example, a sample item for a perceived caring climate was "My PE teacher respects kids." A mean scale score was computed in this study for perceived caring climate. The original scale validation study established factor validity, convergent and discriminant validity, and internal consistency was established with a Cronbach alpha coefficient of .92 (Newton, Fry, Watson et al. 2007) but as noted previously additional reliability and validity checks are needed for use in physical education settings.

Self-Efficacy

To assess students' self-efficacy, six items were adapted from a previous study (Gao et al., 2007). This scale taps into students' efficacy for performing physical activity or sport related skills in physical education class. The participants responded to the items using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*), with the stem "With regard to this week's basketball activity, I have confidence in…." The indicators of self-efficacy were: (a) "my ability to doing well in basketball"; (b) "my ability to learn skills well in basketball"; and (c) "my performance in basketball"; (d) "my knowledge needed to do well in basketball"; (e) "my success in basketball if I exert enough effort"; and (f) "my ability to handle the nervous feelings related to basketball." The mean of these six items was used as the value for self-efficacy. Previous research conducted by Rodgers and Brawley (1996) indicated that the scale demonstrated acceptable internal consistency with Cronbach alpha's in the pretest being .82 and .92 in the posttest assessments.

Intrinsic Motivation

Intrinsic Motivation Inventory (IMI) is a multidimensional 45-item measure based on the work of Ryan (1982) in the educational domain. McAuley, Duncan, and Tammen (1989) later validated the scale in the sport context to assess participants' intrinsic motivation in achievement activities. Although the entire questionnaire is referred to as the IMI, there are also a number of subscales within the questionnaire assessing participants' level of self-report interest/enjoyment, perceived competence, effort,

value/usefulness, felt pressure and tension, and perceived choice while performing the activity. McAuley and his colleagues (1989) noted all of the subscales of the IMI were rarely used in previous research and inclusion or exclusion of any subscale failed to adversely affect the remaining subscales. The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation and for the purpose of this study, only the level of interest/enjoyment subscale was used. In addition, according to McAuley and his colleagues (1989) the items within the IMI can also be modified to fit a wide variety of activities by replacing the words "this activity" to the appropriate activity. Therefore, this study slightly modified the items within the interest/enjoyment subscale for tense and to fit the physical education context. For example, "This activity was fun to do" was modified to "[Basketball] [is] fun to do." In each case, "this activity or activity" was replaced with "basketball" and the past tense items were altered to present tense. The interest/enjoyment subscale includes 7 items that the participants responded using a 7-point Likert-type scale (1 = *not at all true,* 3 = *somewhat true,* 7 = *very true*). The stem for each item was "how do you feel about basketball" and participants were instructed to indicate how true each statement was for them. An example was, "I enjoy basketball very much." A mean score was computed. McAuley and colleagues (1989) reported strong support for the psychometric properties of the IMI. In addition, the reliability and factor structure of using shorter versions of the IMI (e.g., using only specific subscales) has been established by numerous studies using the shorter version of the instrument to assess intrinsic motivation of physical activity among adolescent physical education students (Cury et al., 1996; Koka, & Hein, 2003).

Physical Activity

Physical activity was measured objectively in this study with pedometers. The pedometer selected for this study was the Yamax SW-200 (YX200). The YX200 was selected over alternative pedometer models because the YX200 proved reliable in producing similar values for steps and it has been deemed suitable for applied physical activity research (Schneider et al., 2004). The pedometer was worn by the students on the right side of their belt or waistband, in the midline of the thigh, consistent with the manufacturers' recommendations. Steps were recorded on 3 successive days during Time 2 in order to establish consistency and stability in the individuals' step counts.

Data Analyses

Preliminary Analyses

The raw data were entered into a SPSS 16.0 data file and cleaned. Three phases of preliminary analyses were conducted. The goal of the first preliminary analysis phase was to identify and rectify any missing values and outliers. The second phase of the preliminary analysis involved three separate steps with the first step dealing with calculating and converting the daily step-count recordings into average steps-per-minute for each day. The second step of the second phase involved identifying any potential group differences between any categorical variables (e.g., school affiliation, gender, and grade level) and the dependent variables (i.e., physical activity, intrinsic motivation, and self-efficacy). The third step of the second phase of the preliminary analyses involved testing if there was correspondence or differences in the 3 days of physical activity data

through an analysis of variance with repeated measures. If there was a difference in the data for the 3 days of physical activity then all of the participants who did not complete all 3 days of physical activity must be removed from the data analysis. If there was correspondence then the participants who failed to complete all 3 days of physical activity measurements could be retained in the data analysis. The final and third phase of the preliminary analyses was conducted to determine whether the final data set met the assumptions (normality, linearity, homoscedasticity, and multicollinearity) of the statistical tests (i.e., multiple regression and path analysis) to be used in this study and whether the various self-report scales were found to have internal consistency reliability.

Main Analyses

Descriptive statistics (mean, standard deviation, minimum and maximum, range, and internal consistency reliability) were calculated for mastery, performance-approach, performance-avoidance, social approval, caring climate, self-efficacy, intrinsic motivation, physical activity, gender, race/ethnicity, age, grade, and years taught by teacher. Frequencies and histograms were conducted for each variable for a visual representation of the spread of scores.

The stated hypotheses were tested using inferential statistics (i.e., correlations, multiple regressions, and path analysis) due to the predictive nature of the research questions as well as the unit of measurement of the variables in the study (e.g., discrete vs. continuous). Inferential statistics were used to increase predictive efficiency and draw inferences about junior high school students in physical education class from the sample

of students in the study. Specifically, bivariate correlations were conducted to describe the degree of association between the variables in the study, whereas multiple regressions were performed to test the hypotheses and the statistical test allows the researcher to predict the simultaneous impact of more than two independent variables (e.g., physical education climate) on a dependent variable (e.g., SPM or steps-per-minute, intrinsic motivation, and self-efficacy). Specifically, multiple regression analysis allowed the researcher to gain an understanding of the overall contribution of the independent variables (e.g., physical education climate and cognitive processes) to the dependent variable (e.g., physical activity and cognitive processes), and the unique contribution of each variable to the dependent measure.

The main purpose of this study and the last hypothesis in this study sought to determine whether self-efficacy and intrinsic motivation mediated the relationship between students' perceptions of a physical education climate and physical activity (SPM). Two separate statistical procedures were conducted to test for mediation. First, Baron and Kenny's (1986) four-step process was utilized to test for mediation that required separate regression analyses to be conducted from the independent variables to the dependent variables. Second, path analysis was conducted as well to test the overall fit of the proposed model in this study because path analysis can help make the assumptions, variables, and hypothesized relationships in a theory or combination of theories more explicit (Olobatuyi, 2006). Further, path analysis provides a visual representation of a complex argument and could represent a useful method of understanding the relationships involved in the proposed model in real life situations.

CHAPTER 4

RESULTS

This chapter is divided into five sections. The first section provides details of the data entry, data cleaning, and the preliminary analyses. The second section provides descriptive statistics and correlations that were calculated to gain a basic understanding of the data and the degree of association between the variables in the study. The third and fourth sections involve the main analyses (e.g., regression and mediational analyses) addressing the research questions and hypotheses in the study. Lastly, the fifth section provides additional supplemental analyses (e.g., mediational analysis) to provide further explanation of the research questions and the data.

Data Entry, Data Cleaning, and Preliminary Analyses

The raw data were entered into a SPSS 16.0 data file. Prior to any statistical analyses, the data were cleaned and inspected to ensure reliable data entry by conducting frequencies to visually determine if there were any inconsistencies within the data. Inaccuracies noted in the frequencies output were corrected by going back to the raw data and checking data entry. Due to some apparent errors, the researcher decided to double-check the accuracy of the data entry by selecting every 10^{th} entry to examine accuracy of

data entry and any necessary adjustments were made. Overall, there were only a few errors identified utilizing this method and the researcher was satisfied with the quality of the data entry.

The first phase of the preliminary analyses in this study involved identifying and handling any missing values and outliers. The second phase of the preliminary analyses involved calculating and creating the dependent measure in the study from steps-per-day (Time 2 Day 2, Day 3, and Day 4) to create average steps-per-minute (SPM) across all days, check for group differences between categorical variables (e.g., school affiliation, gender, and grade level) and the dependent variables (i.e., physical activity, intrinsic motivation, and self-efficacy), and to test if there was correspondence or differences in the three physical activity days data through an analysis of variance with repeated measures. The third phase of the preliminary analysis involved testing the statistical assumptions of the tests (i.e., multiple regression and path analysis) in the study.

The first part of the first phase of the preliminary analyses was to address any potential missing values in the data set. The missing values in this study were first identified by scanning the data set visually, and then by assessing the frequencies. After the missing cases were identified, the raw data were double-checked for correct data entry. After this process a decision was made to utilize subject mean substitution for each missing value found in the questionnaire portion of the data. The participant mean was used as opposed to the group mean because this technique is considered more accurate and a truer representation of the participant's score. In addition, a subject mean substitution was performed instead of deleting the cases listwise or some other available

data imputation technique because only 7% of the participants of the study had at least one missing value and the missing values were missing completely at random in the data set. Also, Newton and Rudestam (1999) noted that the method of mean substitution produces results more representative of the original correlation matrix as opposed to any other data imputation method.

The second step of the first phase of the preliminary analyses was to identify any potential outliers present in the data set. Again, the initial step was to visually inspect the data and conduct frequency distributions to identify scores that appeared far from the other scores. Additionally, scatterplots, box and whisker plots, and stem-and-leaf diagrams were utilized to visually examine the scores that appeared unattached (3 standard deviations away from the mean) to the bulk of the distribution. A few outliers were identified following these strategies. The raw data or the individual identification number case was double-checked to ensure quality data entry. If the outliers were still present then the decision was made to retain but modify the outliers so that they were not overly influential to the results in the study. The final result of the data entry and cleaning led to a final sample size of 513.

The first step of the second phase of the preliminary analyses was to calculate and convert the daily pedometer step-count recordings into average steps-per-minute (SPM) for the three total physical activity days for each participant. This calculation was first performed by converting the total steps-per-day for each participant into average steps-per-minute by dividing by the total lesson time in minutes. Time was 25 minutes for all days and all classes, except for the males in school 4 on two separate days. Due to

unforeseen circumstances (nonavailability of the gym space), these classes were only 20 minutes long. This class's steps per minute were divided by 20 minutes. If a participant only had 1 or 2 days of recordings of steps-per-minute then either that 1 day was used or the average of the 2 days was calculated. The three SPM data points were averaged to create a single variable referred to as SPM (average steps-per-minute).

The second step of the second phase of the preliminary analyses was to check for group differences between categorical variables (e.g., school affiliation, gender, and grade level) and the dependent variables (i.e., physical activity, intrinsic motivation, and self-efficacy). The initial step was to conduct a one-way analysis of variance to test for any potential differences between school affiliation (schools 1-4) and the dependent variables (i.e., SPM, intrinsic motivation, and self-efficacy). Intrinsic motivation (F (3, 508) = 0.49, p = .69) and self-efficacy (F (3, 509) = 1.25, p = .29) did not differ relative to school affiliation. The results of the analysis of variance test between school affiliation and SPM revealed there was a significant difference (F (3, 505) = 56.71, p < .001) between the four schools and SPM (M_{school_1} = 48.92; M_{school_2} = 53.66; M_{school_3} = 66.61; and M_{school_4} = 67.01) with unequal homogeneity of variance (F (3, 502) = 6.41, p < .001). Therefore, a Tukey-Kramer post hoc test was conducted to determine which schools' means on SPM differed from one another. This particular test was chosen over other alternative post hoc tests due to unequal sample sizes between schools. Results revealed that schools 1 and 2 were significantly different from one another and both schools 1 and 2 were significantly different from schools 3 and 4, respectively (p < .05). Also, schools 3 and 4 were not significantly different from one another (p > .05).

The next step was to conduct a *t*-test to confirm the group difference and the size of the difference between school affiliation (schools 1-4) and SPM. This required checking for differences between schools 1 and 2 together as one group in comparison to schools 3 and 4 together as one group. The results of the *t*-test revealed there was a difference, $t(504) = -12.74$, $p < .01$, between combined school groups 1 and 2 for SPM from combined school groups 3 and 4. Further, Cohen's measure of effect size (*d*) was computed to test for the size of the difference between the two school groups and SPM. A large effect size was found ($d = 1.14$; Newton & Rudestam, 1999).

The next step was to check for group differences only between schools 1 and 2 relative to physical activity (SPM). The results of the *t*-test indicated there was a difference, $t(232) = -3.07$, $p < .05$, between schools 1 and 2 for physical activity. Therefore, an additional *t*-test was conducted between only schools 3 and 4 with regard to physical activity. The results revealed there was no difference, $t(273) = -0.34$, $p > .05$) between schools 3 and 4 for physical activity. Because there was a statistically significant difference with a large effect size for a key dependent variable (i.e., SPM) between schools 1 and 2 individually to physical activity but not between schools 3 and 4 individually to physical activity, the researcher decided to split the data set down to include only schools 3 and 4 in the analyses. Therefore, the final data set was split from $N = 513$ to $N = 275$.

The last step was to conduct several separate one-way analysis of variance tests with the final data set to determine if there were any potential differences between the remaining categorical variables (i.e., gender and grade level) and the dependent variables

(i.e., physical activity, intrinsic motivation, and self-efficacy) in the study (see Table 2). No statistically significant differences emerged between gender and self-efficacy ($p > .05$). However, there was a statistically significant difference between gender and SPM ($p < .001$) and between gender and intrinsic motivation ($p < .05$). Overall, the females ($M = 59.30$) were less active averaging far fewer steps-per-minute than the males ($M = 74.14$) and the males ($M = 4.99$) indicated slightly higher intrinsic motivation for basketball than the girls ($M = 4.57$). Grade level was used in the analysis instead of age but no statistically significant differences were found for SPM, intrinsic motivation, or self-efficacy. Group differences between race or ethnicity were not tested as the majority of the sample consisted of Caucasians ($n = 187$) and the remaining race categories were mixed ($n = 50$) or not identified ($n = 38$).

The third step of the second phase of the preliminary analyses involved examining whether there was correspondence or differences in the 3 days of physical activity data. An analysis of variance with repeated measures to test the equality of the means of the steps-per-minute by each day was conducted. Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2 (2) = 7.09$, $p < .05$. Therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (.97). The results indicated that there was not a significant effect of the 3 physical activity days (Time 2 Day 2, Day 3, and Day 4), $F (1.94, 436.40) = 0.327$, $p = .71$. Therefore, all participants with at least one physical activity measurement were retained in the data set, leaving the total sample size at $N = 275$.

The third phase of the preliminary analysis was to check whether the data met the

Table 2

Analysis of Variance for Select Demographic Variables

Source	*M*	*SD*	*F*	*p*
	SPM			
Gender			117.48	.000
Male	74.14	11.46		
Female	59.30	11.23		
Grade Level			2.79	.063
7	65.49	13.65		
8	68.84	11.95		
9	64.73	15.16		
	Intrinsic Motivation			
Gender			3.96	.047
Male	4.99	1.82		
Female	4.57	1.62		
Grade Level			1.04	.356
7	4.57	1.84		
8	4.94	1.71		
9	4.70	1.69		
	Self-Efficacy			
Gender			2.85	.093
Male	3.94	0.89		
Female	3.77	0.82		
Grade Level			0.47	.626
7	3.80	0.89		
8	3.91	0.86		
9	3.81	0.83		

assumptions of the main analyses or statistical tests (i.e., multiple regression and path analysis) to be used in this study. The data were explored for normality, linearity, homoscedasticity, and multicollinearity; several tests were used to check for normality of the data distribution. The first inspection of the data consisted of a visual inspection of the data plots utilizing frequency distributions, histograms, and stem-and-leaf diagrams. Frequency distributions and graphical data indicated statistical (i.e., skewness and kurtosis) and visual concerns for nonnormality for mastery, caring climate, self-efficacy, and intrinsic motivation as being mostly negatively skewed for all. Therefore, additional normality tests such as the Kolmogorov-Smirnov and the Shapiro-Wilkes statistics were conducted on all of the variables of interest in the study. The tests indicated that the variables (with the exception of steps-per-minute) had nonnormal distributions. Therefore, the majority of the variables in this study were not normally distributed and mostly negatively skewed.

The next assumption tested was linearity between the independent variables and the dependent variable. If the relationship is not linear, the results of the regression analysis could under-estimate the true relationship between the independent and dependent variable. Linearity was tested by examining the residual plots (plots of the standardized residuals as a function of standardized predicted values). The visual examination of the residual plots indicated a linear relationship between the dependent variable and the independent variables in the study. This meant that the assumption of linearity between the predictor and criterion variables was met.

The third assumption tested was homoscedasticity. Violations to homoscedasticity can lead to serious distortions of findings and weaken the analyses (Tabachnick & Fidell, 2007). Homoscedasticity was checked by visual examination through the plot of the standardized residuals (the errors) by the standardized predicted value. Ideally, the residual plots are randomly scattered around the horizontal line, whereas heteroscedasticity is indicated when the residual plots are not evenly scattered around the horizontal line but in a pattern formation (Newton & Rudestam, 1999). The results of the residual plots did not reveal a perfect scatter around the horizontal line but the residuals were fairly well scattered around the horizontal line and there was no indication of a pattern for any of the variables in the study. Thus, homoscedasticity was not violated.

The fourth assumption of the statistical tests was testing for multicollinearity. Multicollinearity occurs when two or more predictor variables are highly correlated with one another that could pose difficulty in accurately assessing their relative importance to the dependent or criterion variable (Petraitis, Dunham, & Niewiarowski, 1996). Detecting high multicollinearity is a matter of degree and there is no one test that determines if it is a problem or not. However, several tests provide warning signs of high multicollinearity among predictor variables. These include simple bivariate correlations, tolerance, VIFs, eigenvalues, and the condition index. After analyzing the simple bivariate correlations between the independent variables in the main analyses, other than self-efficacy to intrinsic motivation (.79) there were no correlations higher than .62. Tolerance values were all well above the .10 cutoff point and the VIFs were well above the .40 cutoff value. The eigenvalues were approaching zero that could indicate some concern but the

condition indexes were all below 15. Therefore, the multiple tests for multicollinearity indicated it was not an issue.

Overall, the assumption of normality alone was violated that would normally indicate using nonparametric tests over parametric tests but multiple regression and path analysis both do not have nonparametric equivalent tests available through SPSS. Therefore, the results of the main analyses should be taken with caution due to the violation of the normality assumption. The last assumption tested was internal consistency reliability of the measurements (questionnaires), and is discussed next.

Descriptive Statistics

Table 3 presents the means, standard deviations, minimums and maximums, range, and internal reliabilities of the variables assessed in the study. As shown, Cronbach's alpha coefficients ranged from .74 to .95 indicating that the measures employed were internally reliable (α above 0.70, Pedhazur, 1982). Overall, the students exhibited high means but relatively low standard deviation scores for mastery (M = 3.53, SD = 0.79), perceived caring climate (M = 3.86, SD = 0.73), self-efficacy (M = 3.85, SD = 0.86), and intrinsic motivation (M = 4.78, SD = 1.73). In addition, as expected, the students also reported low mean scores for performance-avoidance (M = 2.14, SD = 0.72). Although the means are typical of previous research involving these variables the standard deviations are considered low that could result in low or weak relationships in the correlations. This finding points to the concern of not meeting the normality assumption for the main analyses in this study in that these variables were not normally

Table 3

Means, SDs, Minimums and Maximums, Ranges, Internal Reliabilities, and 95% C.I.

Variable	Mean	*SD*	min – max	range	α	95% C.I. Lower	95% C.I. Upper
Mastery	3.53	0.79	1 – 5	4	0.84	0.81	0.87
Performance-Approach	2.22	0.80	1 – 5	4	0.80	0.77	0.84
Performance-Avoidance	2.14	0.72	1 – 5	3	0.74	0.70	0.80
Social Approval	2.63	1.00	1 – 5	4	0.91	0.90	0.93
Caring Climate	3.86	0.73	1 – 5	4	0.93	0.92	0.94
Self-Efficacy	3.85	0.86	1 – 5	4	0.92	0.90	0.93
Intrinsic Motivation	4.78	1.73	1 – 7	6	0.95	0.94	0.96
Average Steps per Minute	66.75	13.55	24 – 103	79	0.87	0.84	0.90

distributed and seem to be bulked (mostly negatively skewed) at one end of the distribution. However, the overall range of the scores does not support this lack of variability in the student responses. Only performance-avoidance (range = 3) had a limited range value. The students' perceptions of mastery, performance-approach, social approval, self-efficacy, and intrinsic motivation all had a full range of responses (4 and 6, respectively).

Correlations

Pearson product-moment correlations (also referred to as Pearson's *r*) were computed to examine the degree of association or strength of the relationship among the observed variables (see Table 4). According to Thomas, Nelson, and Silverman (2005), a correlation coefficient value can range from .00 to 1.00 in either a positive or negative

Table 4

Pearson Product-Moment Correlations Among Variables

Variable	1	2	3	4	5	6	7	8
1. Mastery	-							
2. Performance-Approach	-.23**	-						
3. Performance-Avoidance	-.12	.56**	-					
4. Social Approval	.19**	.49**	.41**	-				
5. Caring Climate	.62**	-.41**	-.33**	.01	-			
6. Self-Efficacy	.18**	-.06	-.14*	.05	.15*	-		
7. Intrinsic Motivation	.14*	.00	-.10	.11	.07	.79**	-	
8. Average Steps per Minute	-.17**	.21**	.09	.16**	-.24**	.32**	.38**	-

*Note. * $p < .05$, ** $p < .01$*

direction. Although opinions vary, an *r* value above .9 indicates a very high correlation, .7 to .9 indicates a high correlation, .5 to .7 indicates a moderate correlation, .3 to .5 indicates a low correlation, and anything below .3 indicates very little if any correlation (Thomas et al., 2005). The correlational results overall foreshadowed many of the later analyses, indicating low to moderate relationships between the variables of interest.

Specifically, students' perceptions of the teacher's emphasis on mastery goals (r = -0.17, $p < .01$) and caring climate (r = -0.24, $p < .01$) both indicated very little and counter to initial predictions resulted in negative relationships with physical activity. Both perceived performance-approach (r = 0.21, $p < .01$) and social approval (r = 0.16, $p < .01$) resulted in a very little but at least consistent with the initial prediction resulting in a positive relationship with physical activity, whereas perceived performance-avoidance (r = 0.09, $p > .05$) was not related to physical activity and counter to the initial negative

relationship prediction. Overall, the correlations between the perceived physical education climate and physical activity provided minimal initial support of the hypothesized relationships in the study with mixed directions from the original predicted relationships.

Students' perceptions of a teacher's emphasis on mastery goals ($r = 0.14$, $p < .05$) indicated a very little positive relationship with perceived intrinsic motivation, providing minimal initial support for the hypothesized relationship in the study but in the hypothesized direction of the relationship. All of the remaining perceived physical education climate variables (i.e., performance-approach; $r = 0.00$, $p > .05$); performance-avoidance ($r = -0.10$, $p > .05$); social approval, ($r = 0.11$, $p > .05$); and caring climate ($r = 0.07$, $p > .05$) were not related to intrinsic motivation but the relationships were in the predicted directions other than performance-approach which was predicted to be a positive relationship. As a whole, the correlations indicated very little or no initial support of the overall hypothesized relationships between the perceived physical education climate variables and intrinsic motivation.

The students' perception of a teacher's emphasis on mastery goals ($r = 0.18$, $p < .01$) and caring climate ($r = 0.15$, $p < .05$) both indicated a minimal positive relationship with perceived self-efficacy but were in the predicted direction of the relationships. Also, perceived performance-avoidance climate ($r = -0.14$, $p < .05$) indicated a very little but in the predicted negative relationship direction to self-efficacy. These three individual relationships provided very little initial support for the hypothesized relationships in the study but the relationships were in the predicted directions. In addition, perceived

performance-approach (r = -0.06, p > .05) and social approval (r = 0.05, p > .05) were not related to perceived self-efficacy thus the relationships between the perceived physical education climate variables and self-efficacy indicated very little to no initial support of the hypothesized relationships in this study. Again, performance-approach predicted to be positively related to self-efficacy was not the result here but social approval did result in the predicted direction.

The correlation analysis also revealed a low positive relationship between students' perceived self-efficacy (r = 0.32, p < .01) and physical activity as well as a low positive relationship between perceived intrinsic motivation (r = 0.38, p < .01) and physical activity. However, once again the relationships were at least in the predicted directions. Therefore, the correlations provided modest initial support of the hypothesized relationships between self-efficacy and intrinsic motivation on physical activity, individually. Lastly, the correlation analysis between perceived self-efficacy and intrinsic motivation revealed a high positive relationship (r = 0.79, p < .01), providing high initial support of the interrelationship between self-efficacy and intrinsic motivation.

Regression Analyses

Regressions were conducted for the main analyses in the study to test for direct and mediational effects between the independent and dependent variables. Separate regression analyses were conducted to determine the extent that the perceived physical education climate directly or indirectly predicted physical activity, perceived intrinsic motivation, and perceived self-efficacy, respectively. Another main aim in this study was

to examine if perceived self-efficacy and intrinsic motivation predicted physical activity as well as one another. Therefore, six separate linear regression analyses were performed using the SPSS 16.0 statistical analysis package to support or refute the hypotheses. Because no a priori hypotheses were made to determine the order of entry of the variables, a linear multiple regression using the enter method (each independent variable was entered in usual fashion) was employed for the independent or predictor variables in the study.

Multiple regression models were used to test the ability of multiple predictor variables (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) to predict change in a single criterion variable (i.e., physical activity, intrinsic motivation, and self-efficacy). The regression equation represents the equation for a straight line. The regression coefficient, *b*, represents the slope of the line and the constant represents the Y-intercept. The results of the linear regressions are summarized in Tables 5 through 10, the beta's {unstandardized coefficient (*B*), and standard error of the unstandardized coefficients (SE *B*), standardized coefficient (β), the *t*-values, and (Sri^2) semi-partial correlations} for each predictor were calculated with the SPSS statistical program. Unstandardized regression coefficients represent the amount of change in the dependent variable associated with one-unit change in the specific independent variable, with all other independent variables being held constant (Newton & Rudestam, 1999). The standardized regression coefficient normalizes the standard deviations in the sample population and tends to have more utility when comparing the relative importance of predictor variables (Hatcher, 1994). The *t* value indicates whether

a particular predictor variable statistically predicts the criterion. Lastly, the semipartial (part) correlation (Sri^2) refers to the unique contribution of each predictor to the total variance of the dependent variable. In other words, in the regression equation, the semi-partial correlation represents the amount by which the R^2 (the total variance explained in the dependent variable from all of the independent variables combined) would be reduced if that variable were removed from the regression equation. The level of statistical significance was set at .05 for each predictor variable on the criterion variable.

Hypothesis 1: Physical Education Climate Predicting Physical Activity

A linear regression analysis was conducted for Hypothesis 1 to determine if students' perceptions of the physical education climate predicted students' average steps-per-minute (SPM). The results of this linear regression analysis indicated how change in the physical education climate was associated with change in students' average steps-per-minute.

The results of the linear regression produced an adjusted $R^2 = 0.08$ (F (5, 273) = 5.70, $p < .05$). The strongest predictors in the model were social approval ($\beta = .18$, $t = 2.42$, $p < .05$) and caring climate ($\beta = -.18$, $t = -2.25$, $p < .05$; see Table 5). Together, the physical education climate shared 8% explained variance in students' average steps-per-minute. The unique contributions of social approval ($Sri^2 = .14$) and perceived caring climate ($Sri^2 = -.13$) both were identified as strong contributors to the overall regression model but in opposite directions. Social approval was positively associated with average steps-per-minute, whereas caring climate was negatively associated with average steps-

Table 5

Physical Education Climate Predicting Physical Activity

Full Model (Adjusted R^2 = 0.08, F (5, 273) = 5.70, p < .01)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Mastery	-1.39	1.31	-0.08	-1.07	0.06
Performance-Approach	1.59	1.37	0.09	1.16	0.07
Performance-Avoidance	-1.91	1.38	-0.10	-1.39	-0.08
Social Approval	2.40	0.99	0.18	2.42*	0.14
Caring Climate	-3.39	1.50	-0.18	-2.25*	-0.13

Note. * p < .05

per-minute.

Overall, the linear regression conducted for Hypothesis 1 was found to be marginally supportive by producing a significant model. However, students' perceived physical education climate as a whole only predicted 8% of the variance in students' average steps-per-minute. In addition, other than social approval and caring climates, no other predictors or hypotheses were supported. A teacher's emphasis on perceived mastery goals (β = -.08, t = –1.07, p = .29) and the two performance goals (performance-approach, β = .09, t = 1.16, p = .25; performance-avoidance, β = -.10, t = –1.39, p = .17) were all not statistically significant and weak predictors of students' average steps-per-minute and thus these hypotheses were not found to be supported.

Hypothesis 2: Physical Education Climate Predicting Intrinsic Motivation

As with Hypothesis 1, a linear regression analysis was conducted to test Hypothesis 2 to determine if students' perceptions of the physical education climate predicted students' perceptions of perceived intrinsic motivation. The results of this linear regression would indicate how, on average, a change in the physical education climate would be associated with change in perceptions in intrinsic motivation. The results are presented in Table 6.

The linear regression produced an adjusted $R^2 = 0.03$ (F (5, 270) = 2.61, $p < .05$). All of the predictors in this model were found to be not statistically significant, except for perceived performance-avoidance ($\beta = -.18$, $t = -2.37$, $p < .05$) that had a negative association with perceived intrinsic motivation. Together, the physical education climate shared 3% explained variance in perceived intrinsic motivation. In particular, the semi partial correlation indicated that perceived performance-avoidance ($Sri^2 = -.14$) was a modest contributor to the total variance in perceived intrinsic motivation indicating that 14% of the total 3% variance predicted in the model would be reduced if performance-avoidance was removed from the model.

Overall, the significant model associated with the linear regression marginally and partially supported Hypothesis 2, producing a statistically significant model. However, the physical education climate as a whole only predicted 3% of the variance in perceived intrinsic motivation. In addition, other than perceived performance-avoidance no other hypotheses were supported. Although a teacher's emphasis on perceived performance-approach ($\beta = .05$, $t = 0.66$, $p = .51$) and social approval ($\beta = .13$, $t = 1.75$, $p = .08$) goals

Table 6

Physical Education Climate Predicting Intrinsic Motivation

Full Model (Adjusted R^2 = 0.03, F (5, 270) = 2.61, p < .05)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Mastery	0.29	0.17	0.14	1.71	0.10
Performance-Approach	0.12	0.18	0.05	0.66	0.04
Performance-Avoidance	-0.43	0.18	-0.18	-2.37*	-0.14
Social Approval	0.23	0.13	0.13	1.75	0.11
Caring Climate	-0.11	0.20	0.05	-0.57	-0.03

Note. * p < .05

approached statistical significance these two predictors were still very weak predictors of perceived intrinsic motivation. Perceived caring climate (β = -.05, t = –0.57, p = .57) was also not a statistically significant predictor of perceived intrinsic motivation. Thus, other than perceived performance-avoidance all of the hypotheses were not supported.

Hypothesis 3: Physical Education Climate Predicting Self-Efficacy

A linear regression analysis was conducted to determine if students' perceptions of the physical education climate predicted students' perceptions of self-efficacy. Students' perceptions of mastery, performance-approach, performance-avoidance, social approval, and caring climate were entered into the equation as predictor variables, with perceptions of self-efficacy entered as the criterion variable. The results of this linear regression indicated how, on average, the change in the physical education climate is

associated with change in perceptions of self-efficacy. The results are presented in Table 7.

The results of the linear regression produced an adjusted $R^2 = 0.03$ (F (5, 271) = 2.86, $p < .05$) for the prediction of perceived self-efficacy. All of the predictors in the model were nonsignificant once again, except for perceived performance-avoidance (β = -.16, $t = -2.19$, $p < .05$) that had a negative association with perceived self-efficacy. Together, the physical education climate shared 3% explained variance in perceived self-efficacy. In other words, 3% of the variance in perceived self-efficacy can be predicted by the physical education climate as a whole. Also, the unique variance of performance-avoidance ($Sri^2 = -.13$) indicated that 13% of the total variance (3%) predicted in the model would be reduced if performance-avoidance was removed from the model.

In the end, the results provided partial but minimal support for the third overall hypothesis that perceptions of a physical education climate would predict self-efficacy. The model was significant but many of the subhypotheses were not supported. For instance, perceptions of a teacher's emphasis on mastery goals ($\beta = .13$, $t = 1.69$, $p = .09$) only approached statistical significance, and performance-approach ($\beta = .04$, $t = 0.53$, $p = .60$), social approval ($\beta = .07$, $t = 0.98$, $p = .33$), and caring climate ($\beta = .03$, $t = 0.35$, $p = .73$) all were nonsignificant predictors of perceived self-efficacy and thus these subhypotheses were not supported.

Table 7

Physical Education Climate Predicting Self-Efficacy

Full Model (Adjusted R^2 = 0.03, F (5, 271) = 2.86, p < .05)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Mastery	0.14	0.09	0.13	1.70	0.10
Performance-Approach	0.47	0.09	0.04	0.53	0.03
Performance-Avoidance	-0.20	0.09	-0.16	-2.19*	-0.13
Social Approval	0.63	0.07	0.07	0.98	0.06
Caring Climate	0.34	0.01	0.03	0.35	0.02

Note. * p < .05

Hypothesis 4: Self-Efficacy Predicting Physical Activity

A linear regression analysis was conducted for Hypothesis 4 to determine if students' perceptions of self-efficacy predicted students' average steps-per-minute. The results of this linear regression analysis are presented in Table 8 indicating how, on average, the change in perceived self-efficacy was associated with change in students' average steps-per-minute.

The results of the linear regression produced an adjusted R^2 = 0.10 (F (1, 272) = 31.80, p < .05). Overall, this regression model indicated that perceived self-efficacy (β = .32, t = 5.64, p < .01) explained 10% of the total variance in students' average steps-per-minute.

Hypothesis 5: Intrinsic Motivation Predicting Physical Activity

A linear regression analysis was conducted for Hypothesis 5 to determine if students' perceptions of intrinsic motivation predicted students' average steps-per-

Table 8

Self-Efficacy Predicting Physical Activity

Full Model (Adjusted R^2 = 0.10, F (1, 272) = 31.80, p < .01)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Self-Efficacy	5.13	0.91	0.32	5.64**	0.32

Note. ** p < .01

minute. The results of this linear regression analysis are presented in Table 9 indicating how, on average, the change in perceived intrinsic motivation was associated with change in students' average steps-per-minute.

The results of the linear regression produced an adjusted R^2 = 0.14 (F (1, 271) = 44.65, p < .05). Overall, this regression model indicated that perceived intrinsic motivation (β = .38, t = 6.68, p < .01) explained 14% of the total variance in students' average steps-per-minute.

Hypothesis 6: Self-Efficacy Predicting Intrinsic Motivation

A linear regression analysis was conducted for Hypothesis 6 in an attempt to integrate theory and determine if students' perceptions of self-efficacy predicted students' perceptions of intrinsic motivation. The results of this linear regression analysis are presented in Table 10 indicating how, on average, the change in perceived self-efficacy was associated with change in students' perceived intrinsic motivation.

The results of the linear regression produced an adjusted R^2 = 0.62 (F (1, 270) =

Table 9

Intrinsic Motivation Predicting Physical Activity

Full Model (Adjusted R^2 = 0.14, F (1, 271) = 44.65, p < .01)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Intrinsic Motivation	2.95	0.44	0.38	6.68**	0.38

Note. ** p < .01

Table 10

Self-Efficacy Predicting Intrinsic Motivation

Full Model (Adjusted R^2 = 0.62, F (1, 270) = 431.61, p < .01)					
Predictors	*B*	SE *B*	β	*t*-value	*Sri²*
Self-Efficacy	0.39	0.02	0.79	20.78**	0.79

Note. ** p < .01

431.61, p < .01). Overall, this regression model indicated that perceived self-efficacy (β = .79, t = 20.78, p < .01) explained 62% of the total variance in students' perceived intrinsic motivation.

Mediation Analyses

The seventh research question and main purpose of this study sought to determine whether self-efficacy and intrinsic motivation mediated the relationship between

perceptions of a physical education climate and physical activity. Baron and Kenny's (1986) guidelines for testing for mediation were utilized first followed by path analysis to determine the adequacy of the proposed model.

Baron and Kenny (1986) described this mediation analysis as a four-step process to establish mediation, partial mediation, or lack of mediation for multiple mediators. The first step was to utilize regression on the outcome variable (i.e., SPM) from the predictor variable (i.e., physical education climate) to establish whether there was an effect that could be mediated. This second step involved treating the two mediators as outcome variables. Essentially, the second step was to regress and indicate whether there was a statistically significant relationship between the mediators (i.e., self-efficacy and intrinsic motivation) and the predictor variable (i.e., physical education climate) one at a time. The third step was to regress the dependent variable (i.e., SPM) on both mediators (i.e., self-efficacy and intrinsic motivation) and the predictor variable (i.e., physical education climate) to determine if the mediator variables were significantly related to the dependent variable (i.e., SPM), while controlling for the predictor variable (i.e., physical education climate). The fourth and final step was to determine whether there was complete mediation, partial mediation, or no mediation. For complete mediation the regression model overall must be statistically significant with at least one mediator emerging as a statistically significant predictor of the dependent variable and the relationship between the predictor variable and the dependent variable should be zero or close to zero in step 3. For partial mediation, the same statistical significance rules apply between the mediators and the dependent variable but instead of the predictor variable being close to zero in

predicting the dependent variable the predictor variable should at least be significantly lower than it was in step 1. If none of the above occurs then there is no mediation but some direct relationships could still exist.

Tested Mediation Pathways

Step 1. The first step in the process for testing the mediation pathways involved regressing the five predictors of the physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) on the dependent variable (i.e., SPM) (see Table 5). The direct effect of the physical education climate on SPM resulted in a statistically significant model (adjusted $R^2 = 0.08$ (F (5, 273) = 5.70, $p < .05$) with social approval ($\beta = .18$, $t = 2.42$, $p < .05$) and caring climate ($\beta = -.18$, $t = -2.25$, $p < .05$) as the only significant predictors in the model.

Step 2. The second step involved conducting a regression from the perceived physical education climate to each of the two mediators, one at a time. The first regression (see Table 7) involving self-efficacy on the predictor variable (i.e., physical education climate) resulted in a statistically significant regression model (adjusted $R^2 = 0.03$ (F (5, 271) = 2.86, $p < .05$) with performance-avoidance as the only statistically significant predictor ($\beta = -.16$, $t = -2.19$, $p < .05$). The second regression (see Table 6) involving intrinsic motivation on the predictor variable (i.e., physical education climate) also resulted in a statistically significant regression model (adjusted $R^2 = 0.03$ (F (5, 270) = 2.61, $p < .05$) and again with only performance-avoidance being statistically significant ($\beta = -.18$, $t = -2.37$, $p < .05$).

Step 3. The third step in the Baron and Kenny (1986) mediation process involved a regression equation with both mediators (i.e., self-efficacy and intrinsic motivation) and the predictor variable (i.e., physical education climate) together to control for the initial predictor variable's effect on the dependent variable (i.e., SPM; see Table 11). This regression equation resulted in a statistically significant regression model (adjusted R^2 = 0.23 (F (7, 269) = 12.46, $p < .05$) with the proposed mediator intrinsic motivation emerging as a statistically significant predictor of SPM ($\beta = .27$, $t = 3.08$, $p < .05$) but self-efficacy was not found to be a statistically significant predictor of SPM ($\beta = .16$, $t = 1.80$, $p > .05$). Also, mastery ($\beta = -.15$, $t = –2.08$, $p < .05$), social approval ($\beta = .13$, $t = 1.95$, $p < .05$), and caring climate ($\beta = -.16$, $t = –2.18$, $p < .05$) all were identified as statistically significant predictors of SPM in the regression model.

Step 4. The fourth and final step determined whether the two mediators (i.e., self-efficacy and intrinsic motivation) completely mediated the relationship, partially mediated the relationship, or did not mediate the relationship between the dependent variable (i.e., SPM) and the predictor variables (i.e., physical education climate). Based on the regression equation from step 3 (see Table 11), the results indicated no mediation because the perceived physical education climate variables *beta* weights' failed to approach zero and were not significantly reduced from their *beta* weights' in step 1. Therefore, self-efficacy and intrinsic motivation did not mediate the relationship between the physical education climate and SPM. Although no mediation was determined through Baron and Kenny's (1986) four-step process, direct effects on SPM did emerge from intrinsic motivation, social approval, caring climate, and mastery as indicated in step 3.

Table 11

Physical Education Climate, Self-Efficacy, and Intrinsic Motivation Predicting Physical Activity (Step 3 and 4)

Full Model (Adjusted R^2 = 0.23, F (7, 269) = 12.46, p < .05)						
Predictors	*B*	SE*B*	β	zero-order	*t*-value	*Sri²*
Mastery	-2.53	1.22	-0.15	-0.08	- 2.08*	-0.11
Performance-Approach	1.15	1.26	0.07	0.09	0.91	0.05
Performance-Avoidance	-0.45	1.28	-0.02	-0.10	-0.35	-0.02
Social Approval	1.79	0.92	0.13	0.18	1.95	0.10
Caring Climate	-3.04	1.40	-0.16	-0.18	-2.18*	-0.12
Self-Efficacy	2.50	1.40	0.16	0.32	1.80	0.10
Intrinsic Motivation	2.12	0.69	0.27	0.38	3.08*	0.17

Note. * p < .05

Intrinsic motivation and social approval both emerged as strong positive predictors of SPM, whereas mastery and caring climate predicted a negative relationship with SPM. In addition, perceived social approval and caring climate were both statistically related to SPM without the two mediators being included as predictors of SPM. A teacher's emphasis on mastery goals only emerged as statistically significant when the two mediators were included as predictors in the regression equation towards SPM. Overall, the direct relationships between the statistically significant physical education climate variables (i.e., mastery, social approval, and caring climate) and physical activity remained nearly the same with the exception of perceived mastery when the two proposed mediators were integrated into the equation.

A proposed model was hypothesized from the start of the study to determine whether self-efficacy and intrinsic motivation mediated the relationship between perceptions of the physical education climate (i.e., mastery, performance-approach, performance-avoidance, social approval, and caring climate) and physical activity (SPM; see Figure 3). Although the previous mediational analysis indicated that there was no mediation, path analysis was conducted to determine the adequacy of the proposed model.

Path analysis can also provide a mechanism for testing the adequacy of theories incorporated within this study and examine how well the data fit the theoretical suppositions. In addition, as stated earlier, path analysis can provide a visual representation of a complex argument and represents a useful method of understanding the relationships. Specifically, path analysis is an extension of a regression model but allows the researcher to assess the fit of a model that describes the causal connections between a set of observed variables found from multiple regression analyses and the data (Hatcher, 1994). In other words, path analysis can tell the researcher the paths that are important and the paths that seem to be weak or unimportant.

The adequacy of the model can be evaluated by using absolute fit-indices (Olobatuyi, 2006). However, because there currently is no consensus as to which one is the best due to each statistic having advantages and disadvantages regarding sample size and normality violations, multiple fit-indices are needed to fully evaluate the adequacy of the model (Olobatuyi, 2006). Hatcher (1994) stated "…there is no single index of goodness of fit that is universally accepted; each index provides somewhat different

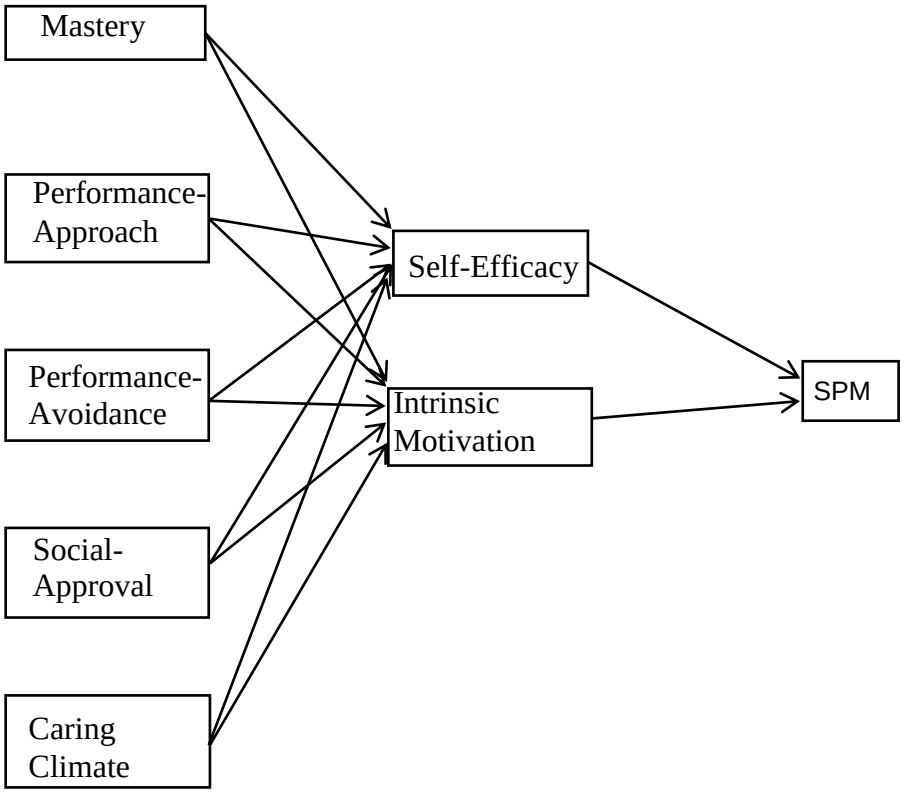


Figure 3. Proposed mediational model.

information" (p.187).

Fit indices can be classified as either absolute or incremental. Absolute fit indices are designed to test whether the model fit is perfect in the population by comparing observed versus expected variances and covariances given the relations among the variables specified by the model (Olobatuyi, 2006). An example of an absolute fit index is the chi-square that indicates the relative amount of variance and covariance incorporated within the proposed model. Chi-square should be as close to zero as possible and be nonsignificant to suggest an adequate model. However, even if chi-square fails to

reach significance it does not mean the model fits the data. Thus, other tests must be considered in conjunction, such as incremental or relative fit-indices.

Incremental or relative fit-indices assess the proportional improvement in fit by comparing a proposed model to a more restricted or baseline model with all observed variables being uncorrelated with one another (Olobatuyi, 2006). Examples of incremental fit indexes are the comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Hu and Bentler (1999) argued the characteristics of an ideal fit are that the CFI and the TLI cutoff values should be close to .95, RMSEA uses a 90% confidence interval with a cutoff value close to .06 for a goodness of fit model.

Hypothesis 7: Outcome of the Proposed Model

Inspection of the fit-indices suggest the model was not supported, {χ^2 (125.59, 2) = 251.17, $p < 0.001$, CFI = 0.66, TLI = -5.11, RMSEA = 0.67 (90% CI = 0.61 - 0.75)}. The chi-square value was found to be statistically significant indicating an inadequate model. In other words, the chi-square value exceeded the critical value at the .05 *p*-value level, which corresponds to an inadequate model. Because the chi-square value does not indicate an overall good fit for the model, alternative fit indices were needed to further substantiate the overall fit. The CFI (0.66) and TLI (-5.11) were also examined. Both the CFI and TLI needed to be close to .95 and they were both very distant from that cutoff value. Lastly, the RMSEA (0.67) was also examined and found to be far from the .06

cutoff value and with a low confidence interval. Overall, the model revealed to have an inadequate and a poor fit to the data (see Figure 4).

If mediation was supported in the model, physical education climate predictors would have had stronger links to the mediators (i.e., self-efficacy and intrinsic motivation) as opposed to one another and directly to average steps-per-minute. In other words, the perceived physical education climate should be strongly predicting the mediators more than physical activity directly and then the mediators should then subsequently even more strongly predict physical activity.

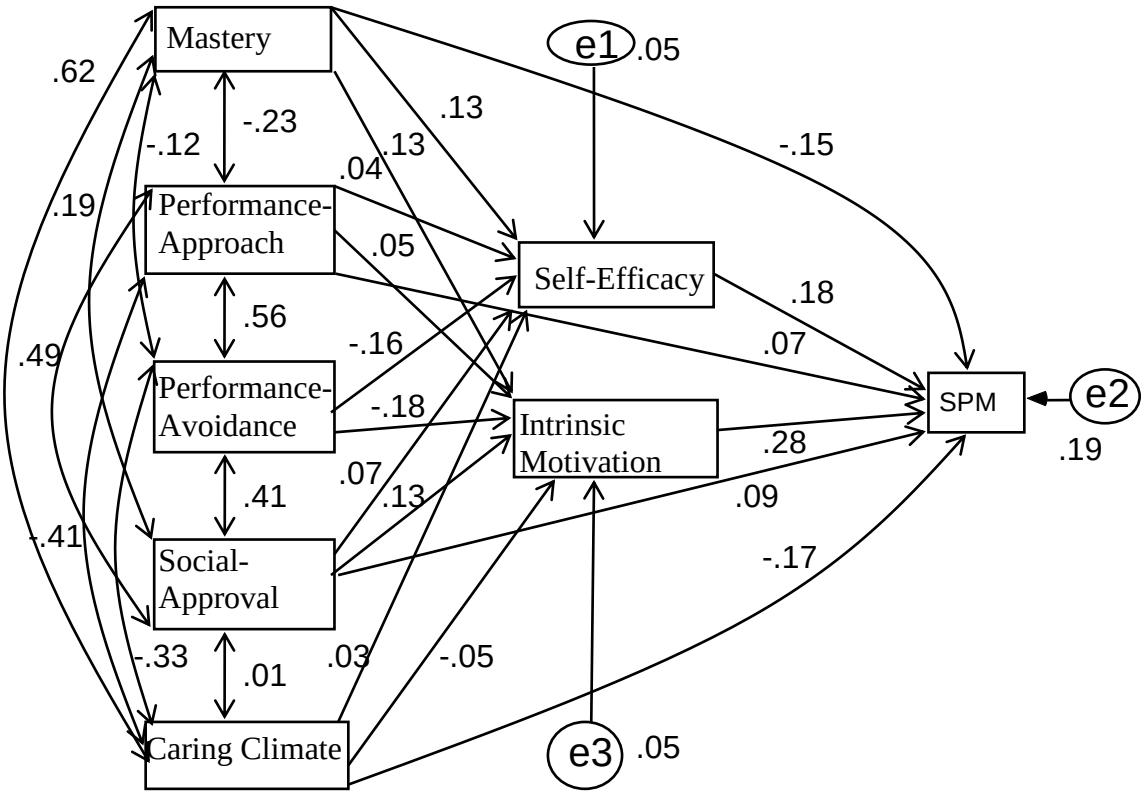


Figure 4. Full model path analysis.

Supplemental Analyses

Compliance and Noncompliance of 50% Physical Activity Recommendation

It is recommended that students are active 50% of the time during physical education class (USDHHS, 2000). Although compliance or noncompliance of this standard was not a research question in this study, it would be useful in terms of teacher training to determine if the relationships examined in this study differed for students who met the recommendation compared to those who did not. Until recently, physical activity data were largely based on self-reported physical activity with a general consensus among researchers that physical activity was being overestimated (Scruggs, 2007). Therefore, Scruggs (2007) assessed physical activity via pedometry (i.e., Yamax Digi-Walker SW701) and determined the minimum steps/min cutoff points that indicated 50% of the lesson time was being spent physically active. In fact, Scruggs (2007) established a steps-per-minute standard for middle school physical education that represents whether students are engaged in physical activity for 50% of a physical education lesson. Instead of a single cut point, a cut point interval was established to allow flexibility and confidence in decision accuracy in interpreting steps-per-minute compliance. Using a similar pedometer as employed in this study, Scruggs (2007) identified the cut point interval as being 82.52 to 87.27 steps-per-minute for the middle school level. If the students' average steps-per-minute fell within this interval then they were considered borderline compliant (82) and compliant (> 88).

Therefore, the researcher applied the same cut point interval for the students' average steps-per-minute in this study to determine whether the students were in noncompliance, borderline compliant, or compliant of the 50% physical activity recommendation. Thirty-seven out of 275 total students or 13.5% were identified as either borderline compliant or in compliance. In this sample, 7.6% were considered borderline compliant or were within the 82 to 88 interval range, whereas only 5.8% were in compliance (> 88). Therefore, the overall findings indicated that 86.5% of the students in this sample were considered to not be in compliance of the 50% physical activity recommendation in a daily physical education lesson. These results indicate a very inactive sample of students for the middle school level.

Path Analysis Supplemental Analysis

An additional path analysis was not a part of the initial research questions or analysis plan. However, the researcher was interested in further exploring the negative relationship that emerged from a perceived caring climate to physical activity and whether combining self-efficacy and intrinsic motivation as a single mediator would lead to an improved prediction for physical activity.

The inverse relationship between a perceived caring climate with the students' physical activity was not expected as previous research found that a perceived caring climate leads to greater enjoyment and future anticipated participation (Newton, Watson, Gano-Overway et al. 2007). Although this finding was peculiar at first glance, this inverse relationship between a caring climate and physical activity does make practical

sense and provides an additional major finding in this study. For example, a student who perceives a caring climate or perceives receiving more attention and support from their teacher may actually receive at least initially more instruction time to support learning and thus in effect this may actually result in lower levels of physical activity. Rather, a student who is taught with more of a punitive approach (e.g., performance-avoidance) may actually have higher levels of physical activity, but perhaps at the cost of psychomotor, cognitive (e.g., self-efficacy and intrinsic motivation), and affective benefits. Ultimately, a perceived caring climate may lead to more engagement in physical activity but that engagement, although valuable in the long term, may not translate into more average steps-per-minute, at least not in the time frame of this study (Magyar et al., 2007; Reeve & Jang, 2006). However recently, Brown and Fry (2009) assessing exercise participants who perceived a caring climate reported higher intrinsic motivation, perceived competence, effort, and commitment to physical activity. Based on the suggested links to higher self-efficacy and intrinsic motivation as well as the high interrelationship between the two cognitive variables, perhaps combining the cognitive variables (i.e., self-efficacy and intrinsic motivation) as a single mediator may result in an improved path model. In other words, perhaps perceived caring interactions between the student and the teacher positively influences the student's perceptions of self-efficacy and intrinsic motivation more directly and improvements in self-efficacy and intrinsic motivation are needed before affecting physical activity participation. Thus, the modified path analysis model sought to determine whether the combined mediator (self-efficacy

and intrinsic motivation) mediated students' perceptions of the lone climate predictor (caring climate) and physical activity.

Inspection of the fit-indices suggested the modified model was not supported, {χ^2 (14.98, 2) = 29.97, $p < 0.001$, CFI = 0.92, TLI = 0.57, and RMSEA = 0.23 (90% CI = 0.16 - 0.30)}. The chi-square was significant that indicated an inadequate model. However, additional fit-indices were required to further substantiate the inadequate model fit. The CFI (0.92) and TLI (0.57) were also examined. Again, both the CFI and TLI needed to be close to .95. The CFI value did approach .95 (.92) but that TLI did not presents conflicting results regarding the overall fit of the modified model. Subsequently, the RMSEA (0.23) was also examined and was not found to be close enough to the .06 cutoff value and the confidence interval did reveal a large range for the RMSEA value. Overall, the modified model was much improved but the model did not pass the multiple fit-indices cutoff values. The lack of an adequate model from a perceived caring climate to the combined mediators (self-efficacy and intrinsic motivation) to subsequently influence physical activity behavior suggests that perhaps additional time is needed for these relationships to emerge, requiring more longitudinal study designs.

CHAPTER 5

DISCUSSION

A central purpose of this study was to better understand bidirectional influences between environmental (i.e., perceived physical education climate) and individual processes (i.e., intrinsic motivation and self-efficacy) that may influence physical activity among adolescents in physical education. A prospective study design was used to investigate the relationships in the study. This chapter is aligned relative to the discussion of the seven research questions addressed in the study. Linear regressions examined the predictability of the students' perceived physical education climate relative to their average physical activity, perceptions of intrinsic motivation, and self-efficacy, respectively. Further, regression analyses were conducted to examine the relationships between intrinsic motivation and self-efficacy individually to physical activity, while also examining the relationship between the two individual processes. Mediational analyses were also conducted to determine if self-efficacy and intrinsic motivation could better explain the relationships between the physical education climate and physical activity as mediators. This chapter also provides a discussion of the limitations and methodological issues in this study along with future research directions for other researchers in the field.

Lastly, this chapter provides a conclusion with practical implications for researchers and physical educators.

Overall, the results of the main analyses in this study yielded mixed results. Although the physical education climate predicted physical activity, perceived self-efficacy, and perceived intrinsic motivation, respectively, the relationships were very low in terms of explaining the overall variance. More specifically, students' physical activity was minimally predicted by the perceived physical education climate with only perceptions of a social approval (positively) and perceived caring climate (negatively) predicting physical activity. A teacher's emphasis on performance-avoidance emerged as the only (negative) predictor within the perceived physical education climate to minimally predict both intrinsic motivation and self-efficacy. However, students' perceived self-efficacy and intrinsic motivation were found to be strongly related to one another and moderately and positively predictive of students' physical activity. Lastly, mediational analyses revealed that self-efficacy and intrinsic motivation did not mediate the relationship between the perceived physical education climate and physical activity. In addition, path analysis failed to fit the model of predicting physical activity towards basketball.

In summation, although there were some significant direct relationships found in this study, regression mediational analysis indicated no mediation for intrinsic motivation or self-efficacy. In addition, path analysis on the proposed mediational model was not found to be a good fit to the data and the factors investigated in this study only accounted for a small amount of variance in physical activity.

Relationships Between the Physical Education Climate, Physical Activity, Intrinsic Motivation, and Self-Efficacy

Three research questions are discussed in this section: (a) Are perceptions of a physical education climate independently related to physical activity? (b) Are perceptions of a physical education climate independently related to intrinsic motivation? (c) Are perceptions of a physical education climate independently related to self-efficacy? Correlational and regression findings are discussed in terms of what has been found in previous research and practical explanations are provided as well.

Physical Education Climate Predicting Physical Activity

The first research question in this study examined whether perceptions of a physical education climate independently predicted subsequent physical activity (i.e., average steps per minute). For the purposes of this study, the physical education climate was created by the physical education teachers and the students were asked whether they perceived their teachers to emphasize mastery goals, performance-approach goals, performance-avoidance goals, social approval goals, and/or caring climate in their class climate. The regression results provided some unexpected but revealing findings. The perceived physical education climate variables overall predicted a modest 8% of the total variance in students' physical activity in basketball. Two of the five physical education climate predictors were found to be statistically significant, but only teacher's emphasis on social approval goals was positively associated to the students' physical activity. In addition, unexpectedly, perceived caring climate emerged as a negative predictor of

students' physical activity. These two modest findings suggest that perceived social approval positively predicted higher levels of physical activity in basketball, but a class climate that was viewed as caring negatively predicted physical activity.

Prior to this study, previous research on social goals and perceived social approval could only subjectively infer a greater interest in an activity or satisfaction in physical education for social purposes (Allen, 2003; Guan et al., 2006; Papaioannou et al., 2007). However, this study attempted to directly predict higher levels of physical activity objectively and assess whether higher levels of physical activity was related to the students' social purpose of investing in an activity. This is one of the major findings in this study albeit activation of perceived social approval goals predicted only a marginal amount of variance in the students' physical activity (Sri^2 = .18). This finding means that at some small level the students were responding to the physical educator who emphasized higher effort while praising them in front of their peers that may in part determine why some students elected to invest in the activity or not. Another alternative would be that the students could have perceived getting approval from their instructor. Therefore, physical educators may be able to obtain higher levels of physical activity in their classes by using more cooperative activities that involve more social interaction in combination with positive and specific encouragement to help students feel more accepted by their peers.

Perceived caring climate resulted in an inverse relationship with the students' physical activity. This finding was not expected and the hypothesis was subsequently rejected. Although Newton, Watson, Gano-Overway et al. (2007) indicated that a

perceived caring climate leads to greater enjoyment and future anticipated participation, there have been no studies that have assessed the direct relationship between perceived caring climate on objective physical activity data. Thus, further research is needed to clarify this direct relationship. Although this finding was peculiar at first glance, this inverse relationship between a caring climate and physical activity does make practical sense and provides an additional major finding in this study. For example, a student who perceives a caring climate or perceives receiving more attention and support from their teacher may actually receive at least initially more instruction time to support learning and thus in effect this may actually result in lower levels of physical activity. Rather, a student who is taught with more of a punitive approach may actually have higher levels of physical activity, but perhaps at the cost of psychomotor, cognitive, and affective benefits. Ultimately, a perceived caring climate may lead to more engagement in physical activity but that engagement, although valuable in the long term, may not translate into more average steps-per-minute, at least not in the time frame of this study (Magyar et al., 2007; Reeve & Jang, 2006). Therefore, future studies should focus on more longitudinal designs to ascertain the long-term effects of perceived caring climate on physical activity levels.

The hypothesis that a teacher's emphasis on perceived mastery goals would be positively related with students' physical activity was also rejected. Despite a relatively high overall mean (M = 3.53, SD = .79) for students' perceptions of a teacher's emphasis on mastery goals, this perception did not translate into predicting more steps-per-minute in basketball based on linear regression results. In addition, the correlations indicated a

low negative relationship between perceived mastery and students' physical activity with the two variables sharing 2.89% of the variance. These findings are contrary to previous research that indicated perceived mastery was predictive of greater perceived effort and persistence on tasks in physical education (Parish & Treasure, 2003). However, the results do point to a trend in the literature related towards assessing physical activity subjectively rather than objectively measuring physical activity in physical education settings. Researchers in previous research would infer that mastery led to more physical activity due to greater perceived effort or persistence on tasks but there was no direct evidence of that effort or persistence resulting in higher levels of physical activity. Similar to perceptions of a caring climate being negatively associated with physical activity, activation of perceived mastery goals may not initially predict higher steps-per-minute. Perhaps, for many lower skilled and less efficacious students in physical education, this finding may indicate that it takes a longer period of time than the time lag employed in this study to effectively lead to greater growth in the psychomotor, cognitive, and affective domains, that subsequently could lead to greater physical activity. Again, future research should focus more on longitudinal research designs to determine the long-term effects of the direct relationship between a teacher's emphasis on mastery goals on the students' physical activity levels.

The last two factors making up the physical education climate yet to be discussed concerns students' perceptions of the teacher's emphasis on the two portioned performance goals. Activation of perceived performance-approach goals was hypothesized to be positively related to students' physical activity, whereas activation of

perceived performance-avoidance goals was hypothesized to be negatively related towards students' physical activity. Both hypotheses were rejected based on the linear regression results. Initial correlations indicated only a small but positive correlation between perceived performance-approach ($r = .21$, $p < .05$) and students' physical activity and no relationship between performance-avoidance ($r = .09$, $p > .05$) and students' physical activity. Further, both perceived performance goals resulted as nonsignificant predictors in the linear regression model towards physical activity with all the physical education climate variables in combination. Previous research has shown ample evidence of the impact of the classic performance climates as a singular construct being maladaptive motivationally to students' effort and persistence on tasks (Ntoumanis & Biddle, 1999). Elliot and Harackiewicz (1996) also indicated consistent findings when the performance goals were conceptually and theoretically split into performance-approach and performance-avoidance goals with performance-approach yielding more adaptive motivational patterns and performance-avoidance leading to more maladaptive motivational patterns towards satisfaction in physical education (Elliot & Harackiewicz, 1996). Recently, Papaioannou and colleagues (2007) found similar inconsistent results with the teacher's emphasis on portioned performance goals. The researchers offered a plausible explanation that could also apply to the finding in this study. The lack of variability for the teacher's emphasis on perceived performance-approach and performance-avoidance variables in this study may be related to separating the two performance goals and that the students' struggled distinguishing between teaching practices that activate performance-approach or performance-avoidance goals,

respectively (Papaioannou et al., 2007). In addition, the low initial correlation towards physical activity combined with moderate correlations with the climate variables may have down played the relevance of both perceived performance goals in the regression equation. This lack of finding may be due to nonnormal data and low variability in responses that in turn may either be due to the sample being too homogeneous or that there are issues within the motivational climate scale. Alternatively, perhaps there were other environmental factors not assessed in this study that influenced their physical activity such as teaching styles, parental support or nonsupport, sense of autonomy, or negative feelings to physical education overall.

Physical Education Climate Predicting Intrinsic Motivation

The second research question in this study examined whether the students' perceptions of the perceived physical education climate independently predicted students' perceived intrinsic motivation towards basketball. The regression results identified only one out of five factors in the perceived physical education climate as being supportive of the initial hypothesized relationships on intrinsic motivation. The combined predictors in the perceived physical education climate predicted a very low and marginal 3% of the total variance in perceived intrinsic motivation towards basketball.

The lone significant predictor was students' perceptions of a teacher's emphasis on performance-avoidance goals negatively predicting students' perceived intrinsic motivation. The inverse relationship between perceived intrinsic motivation and activation of perceived performance-avoidance goals in the regression equation matched

the negative relationship from the initial correlations with the two variables having 1% of shared variance in common. These findings suggest very minimal relationships between perceived performance-avoidance and perceived intrinsic motivation. Previous research has linked performance-avoidance goals with having negative effects on intrinsic motivation with less reported enjoyment (Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). Thus, physical educators who promote normative comparisons in class are likely to diminish their students' enjoyment or intrinsic interest in an activity or task.

The remaining hypotheses and climate predictors within the physical education climate were rejected in the regression results and produced very low initial correlations individually towards perceived intrinsic motivation as well. In particular, the first hypothesis of this research question was that a teacher's emphasis on perceived mastery goals would be positively associated with perceived intrinsic motivation. Possible statistical reasons for the rejected hypothesis again may be due to having shared variance with other climate variables in the regression equation but this lack of significant finding between perceived mastery climate and perceived intrinsic motivation is very uncommon in previous research. There has been an abundant amount of studies positively associating perceived mastery climate with high interest or intrinsic motivation on a task or activity (Biddle et al., 1995; Brunel, 1999; Cury et al., 1996; Escarti & Gutierrez, 2001; Koka & Hein, 2003). The logical possibility for the lack of finding in this study points to measurement error or more specifically the scale employed in the study to assess a teacher's emphasis on mastery goals. However, the scale was found to be internally consistent in this study and in previous research (Papaioannou et al., 2007). In that study

employing the same scale, Papaioannou and his colleagues (2007) positively linked a teacher's emphasis on perceived mastery goals to high perceptions of intrinsic motivation for physical education activities but not to any specific activity. Therefore, future research needs to examine the direct impact of activating perceived mastery goals on intrinsic motivation on specific activities. An alternative explanation could also be that this study was the first study to use this scale in the United States and perhaps additional work is needed on the validity of the scale. Although not a strong contributor in this study, based on strong previous research, it seems plausible that physical educators should be mindful of creating a cooperative classroom climate that emphasizes teamwork, sportspersonship, and effort over ability in hopes of creating more enjoyment in the activity or task.

As with perceived mastery, a teacher's emphasis on perceived performance-approach goals indicated a nonsignificant statistical relationship with students' perceived intrinsic motivation for basketball both with the regression equation and with the initial correlations. In fact, perceived performance-approach and perceived intrinsic motivation had a zero correlation. This finding once again points out that further research is needed to clarify the construct validity of the scale and whether performance goals should be separated or kept as a single construct. Elliot and Church (1997) explained that performance-approach has been a deceptive construct in previous research in a climate when there was a challenge and a threat perceived by the students. So, perhaps there was some confounding influence such as a perceived threat taking place in the setting that was not assessed in this study.

The hypothesis of a teacher's emphasis on perceived social approval goals being positively related to perceived intrinsic motivation was not supported by both the regression equation as well as the initial correlations. Perhaps perceived social approval did not emerge as a significant contributor in the overall regression equation because it was moderately correlated with three other physical education climate variables (i.e., mastery, performance-approach, and performance-avoidance). As with the previous perceived physical education climate variables, further research is needed to clarify the direct relationships to intrinsic motivation, although there was one recent study that did indicate that perceived social approval did have a unique contribution in explaining intrinsic motivation (Papaioannou et al., 2007). Because of some previous support and a marginal correlation indicated in this study, physical educators should be mindful that they may produce greater interest and enjoyment from their lessons if their games or tasks were more cooperative with peer involvement at the junior high school level.

The last hypothesis and factor within the physical education climate in relation to intrinsic motivation was the perception of a caring climate. Although caring has been largely overlooked in the research and no research to date has examined its influence in physical education studies, caring was quantified by Newton, Fry, Watson et al. (2007) and found to be positively related to intrinsic motivation in the physical domain. However, the hypothesis was rejected in this study due to a nonsignificant relationship in the linear regression as well as a very low initial correlation (.49%, shared variance between a perceived caring climate to perceived intrinsic motivation). Not finding a positive relationship between a perceived caring climate and physical activity once again

can potentially be explained by the low variance within the variable and the moderately high correlation with perceived mastery. The interrelationship issues can negatively impact the strength of association that a perceived caring climate produces in the linear regression equation. From a measurement perspective, perhaps the lack of variance in the variable is due to the students' needing a greater variety of responses to the questions on the scale (e.g., from 5 response choices to 7 response choices). Lastly, the findings could also indicate that the perceived physical education climate in this sample was too homogeneous or that more teachers or school class climates were needed for greater variability in responses.

Physical Education Climate Predicting Self-Efficacy

The overall results for the third research question indicated a very weak regression model between the combined perceived physical education climate variables and perceived self-efficacy with only one factor (performance-avoidance) found as being supportive. The combined predictors in the perceived physical education climate were only able to predict 3% of the total variance in perceived self-efficacy. It is worth noting that within this very weak regression model, students' perceptions of a teacher's emphasis on performance-avoidance goals did emerge as a modest negative predictor of perceived self-efficacy. The finding does indicate that students who perceive a class climate as competitive are predicted to have reduced perceived self-efficacy towards basketball. Previous research substantiates this finding linking performance-avoidance goals with low perceived competence, especially in climates that produce fear of failure

(Elliot & Church, 1997; Elliot & McGregor, 2001). In a practical sense, the finding emphasizes the point that physical educators would be prudent to avoid creating a class climate that creates competition and that is based on comparison as it may cause low efficacy students to provide minimal effort on activities or tasks.

Again, the majority of the physical education climate variables failed to predict perceived self-efficacy. The first hypothesis in this research question was that a teacher's emphasis on perceived mastery goals would positively predict perceived self-efficacy toward basketball. Correlations between activating perceived mastery goals and perceived self-efficacy indicated the two variables only shared 3.2% of the variance between one another. This low correlation was also substantiated from the low prediction in the regression model that indicated that activating perceived mastery goals was not a statistically significant predictor towards perceived self-efficacy in the combined model. Failure to support this hypothesis is unexpected and inconsistent with previous research findings. Perceived self-efficacy has been positively linked in sport (Kuczka & Treasure, 2005) and in physical education settings (Cury et al., 1996) to perceptions of mastery climate that emphasizes improvement and working hard on learning something new. One possible reason for the lack of a substantial positive relationship could be perceived mastery being moderately correlated with perceived caring climate (38% shared variance). In addition, the lack of variability in the variables may have attenuated the relationship between the two variables.

A teacher's emphasis on performance-approach goals also failed to predict students' perceptions of self-efficacy. This was an important hypothesis in the study

because previous research was inconsistent with regards to performance-approach being related to positive (e.g., high competence) or negative (e.g., fear of failure) motivational responses (Elliot & McGregor, 2001). The initial correlations indicated that the students' perceptions of a teacher's emphasis on performance-approach goals shared only .36% of the variance with perceived self-efficacy. The regression results for activated perceived mastery goals was not found to be a statistically significant predictor towards perceived self-efficacy in the combined model. A plausible explanation of the lack of positive relationship between perceived performance-approach and perceived self-efficacy is that perhaps the students could not differentiate between teaching practices that activate performance-approach and performance-avoidance teaching practices in these physical education settings (Papaioannou et al., 2007). Further research is needed to clarify whether a teacher's emphasis on performance goals should be separated into performance-approach and performance-avoidance goals.

Another important hypothesis and critical construct in this study was the relationship between the teachers' emphasis on social approval goals on students' perceived self-efficacy. Again, perceived social approval is considered important for the junior high school age range in that social life becomes more and more important in their lives. Previous research in sport (Allen, 2003) and in physical education (Guan et al., 2006) found social goals of participants to be connected to perceived persistence and effort on tasks that could be an indication of greater confidence on the tasks. In addition, Papaioannou and his colleagues (2007) found that a teacher's emphasis on perceived social approval goals led to greater satisfaction in physical education. Yet, the results in

this study found no relationship between students' providing more effort for social reasons and subsequently influencing their perceived self-efficacy towards basketball. One possible reason for this lack of finding is that perceived social approval and perceived self-efficacy only shared 5% of the variance between one another. Because the students already had on average high confidence in basketball and on average had neutral perceptions of social approval that the students' perceptions on social approval may not have been as impactful on their confidence towards basketball.

The final hypothesis and construct of interest was that a perceived caring climate would be positively related to perceived self-efficacy. Prior to discussing the results, it is important to note that there has been limited research with a perceived caring climate and self-efficacy within the physical education setting. However, Gano-Overway and her colleagues (2009) in a physical activity setting did find perceptions of caring to positively predict efficacy related beliefs. In addition, Magyar and her colleagues (2007) were able to link a perceived caring climate to higher participant engagement in a summer youth sport camp, indicating that the leader's confidence in leading and teaching others was essential in promoting a caring climate. Lastly, Brown and Fry (2009) assessing college-aged exercise class participants who perceived a caring climate reported higher perceptions of competence. However, the previous research findings were not supported in this study. The initial correlations indicated a positive correlation between a perceived caring climate and perceived self-efficacy but they only shared 2% of the variance. In the combined regression model perceived caring climate was not found to predict students' perceived self-efficacy. One possibility for the nonsignificant relationship in the

regression model could be again due to a statistical issue with perceived caring climate sharing 38% of the variance with perceived mastery climate causing one to be diminished in the regression model. Again, perhaps there would have been better results in this overall regression model if there were a greater number of classes with additional physical educators that could potentially lead to a greater variety of class climates and greater variability in the student responses overall regarding the perceived physical education climate.

Summary and Additional Analysis Discussion on Research Questions 1-3

In summation, the relationships between the perceived physical education climate and physical activity, perceived intrinsic motivation, and perceived self-efficacy led to only a few statistically significant relationships accounting for a very small amount of variance. Students' perceptions of a teacher's emphasis on social approval goals was the only positive predictor for the students' physical activity and a perceived caring climate was identified as a negative predictor of students' physical activity. In addition, the lone statistically significant physical education climate predictor for both perceived intrinsic motivation and self-efficacy was negative perceptions of a teacher's emphasis on performance-avoidance goals. These findings suggest that physical educators would be wise to stay away from creating class climates that emphasize competition and normative comparisons but promote more cooperative activities that emphasize teamwork.

Lack of support for the other hypotheses in the first three research questions was unexpected and at times contrary to previous research findings. Overall among the variables, there were low correlations and the data were not normally distributed with low variability and high kurtosis overall among the variables in the sample. Therefore, it seems logical to conclude that the low variability was a potential confounding influence on the relationships in the study. Also, this study was the first study to employ the teacher's emphasis on goals scale in the U.S. and perhaps the low variability in the students' responses may have been due to the students' being unable to distinguish between teaching practices for each goal being emphasized by the teacher (Papaioannou et al., 2007). Also, there could have been some confounding effects related to the procedures employed in the study, such as not enough time between assessments or the 4 teachers might have struggled with the lesson plan provided. A few of the teachers seemed prepared in terms of how they would transition the students from one skill or activity to another, whereas other teachers were not as well organized. In addition, the different teaching styles, teacher expectations, or the characteristics of the curriculum at each school may have had confounding effects on the results of the first three research questions. Also, perhaps the perceived physical education climate only predicted 3% (self-efficacy and intrinsic motivation) and 8% (physical activity) of the total variance in the these criterion variables because the climate is a low overall predictor or perhaps there were some other confounding variables or unspecified climate variables not assessed in this study that may account for the remaining variances. For example, there may have been individual differences in how the students perceived the physical

education climate in this setting and culture, their previous history with the teacher and the basketball task itself. Perhaps the fact that the basketball task itself was a team sport rather than an individual sport or cooperative game influenced the results. Further, the students may have been affected by the classes being overcrowded with limited gym space, or they could have been influenced from their peers or their home life. In addition, perhaps the overall levels of physical activity during the lessons themselves confounded the results as well. Therefore, the additional analyses also included Scruggs (2007) cut point interval (82 - 88 steps-per-minute) to determine if the students were in compliance or noncompliance of the 50% of physical activity recommendation in a daily physical education lesson.

Only 13.5% of the students were identified as either being borderline compliant or in compliance with physical activity recommendations. Therefore, the overall findings indicated that 86.5% of the students in this study were moving less than half of the class period. These statistics are contrary to the findings in the Scruggs (2007) study that identified 26.7% as being in noncompliance, 9.4% were considered borderline, and 63.9% were compliant. Overall, the findings from this sample suggest that the majority of the middle school students were not in compliance with the 50% physical activity recommendation. The students in this sample seemed to be a very inactive group of students during daily physical education according to the pedometer based data. However, the basketball task in this study is considered a team sport that allows at times for students to allow other students to do most of the physical activity. Perhaps if an individual activity or cooperative games was chosen the physical activity data would

have reflected persistence and effort. It is possible, however, that these students are still obtaining the necessary 60 minutes per day outside of physical education but the current study did not track their physical activity outside of physical education class. Future research should focus on the students physical activity levels outside of physical education as well. Other suggestions would be to increase the total time in game activity from 15 minutes to 20 minutes and reducing instruction or practice time to get the students in compliance with the 50% physical activity recommendation. Future researchers could also try other activities during class or even compare a team sport to an individualized game or cooperative game. In the end, these low physical activity scores further emphasize the importance of determining the motivational processes that may influence active participation in physical education.

Relationships Between Self-Efficacy, Intrinsic Motivation, and Physical Activity

Research questions four, five, and six are discussed in this section and include (a) Is self-efficacy related to physical activity? (b) Is intrinsic motivation related to physical activity? (c) Is self-efficacy interrelated with intrinsic motivation?

Self-Efficacy Predicting Physical Activity

The fourth research question in this study examined whether perceptions of students' perceived self-efficacy towards basketball positively predicted students' physical activity in basketball. The linear regression result supported the hypothesis

resulting in students' perceived self-efficacy explaining 10% of the total variance in students' physical activity towards basketball in physical education class. These findings are consistent with previous research findings associated with perceived self-efficacy predicting physical activity (Gao et al., 2007; Trost et al., 1999). This finding also suggests to physical educators that it is important to develop both psychomotor skills and cognitive knowledge in physical education students at the junior high school level to help promote greater learning that may result in greater confidence in particular games and activities and in the end may lead to an increased level of participation.

Intrinsic Motivation Predicting Physical Activity

The fifth research question in this study examined whether perceptions of students' intrinsic motivation towards basketball positively predicted students' physical activity in basketball. The regression result provided empirical support for perceived intrinsic motivation positively predicting students' physical activity in basketball. Specifically, the regression result suggests that students' intrinsic interest towards basketball predicted 14% of the total variance that can be accounted for in the students' physical activity in basketball. These findings are also consistent with previous research findings that have also positively correlated intrinsic interest with greater perceived effort and persistence on tasks (Cury et al., 2002; Kavussanu & Roberts, 1996). This regression result provides further support of the direct relationship between intrinsic motivation to physical activity. Practical significance of this finding points to the importance of promoting greater enjoyment and interest at the junior high school level for tasks, games,

or activities in hopes of increasing students' physical activity participation in daily physical education. Possible strategies for physical educators would be to provide students with greater activity or game choices to ensure greater enjoyment. Intrinsic motivation is also of particular interest to physical educators not only due to the rising inactivity rates as students mature and move into adulthood but also because intrinsic motivation or enjoyment in a task is a central curriculum aim at the state and national level (e.g., Standard 6 of the National Association of Sport and Physical Education). In addition, intrinsic motivation is viewed by many physical education professionals as being the key variable in promoting life-long fitness throughout adulthood. Therefore, physical educators would be wise to provide activity choices to their students to increase their level of engagement.

Predicting the Interrelationship of Self-efficacy and Intrinsic Motivation

The sixth research question in this study examined how students' perceived self-efficacy and perceived intrinsic motivation relate to one another within the basketball activity. The hypothesis was that perceived self-efficacy would be positively related with perceived intrinsic motivation. The linear regression result provided empirical support for the interrelationship between perceived self-efficacy and perceived intrinsic motivation. Correlational data indicated that the two variables had 62.4% of variance in common indicating further support for a strong interrelationship. There is no research relative to the interrelationship of the these two variables but previous research has found strong

consistent support for both cognitive variables being strong individual predictors of physical activity behavior (Gao et al., 2007; Morgan et al., 2008; Trost et al., 1999). Conceptually, it makes sense that adolescents who enjoy or have intrinsic interest in an activity may do so because they are more confident or have high self-efficacy in the activity or task. Conversely, it makes conceptual sense that students are more confident in a task or activity in part because their intrinsic interest has led to more consistent effort and persistence on the task. These findings suggest that both perceived self-efficacy and perceived intrinsic motivation are critically important predictors of physical activity behavior. Although they share much in common, they also have unique contributions to physical activity. Perhaps even more critical is the role these two variables play in providing answers to the growing public concern for adolescent inactivity rates and the rise of obesity rates. Rise in inactivity rates may be due to students' lack of confidence or skill level in games and activities that coincide with the students' lack of interest in physical activity overall. In addition, past research has found interest in physical activity to gradually decline with age (Papaioannou et al., 1997; Van Wersch et al., 1992). Physical educators should be mindful of the strong interrelationship between self-efficacy and intrinsic motivation to promote greater confidence and interest in their lessons, units, and physical education overall. Based on students' successes and failures in physical education, these variables may play a critical role in students' future choices and involvement in physical activity overall and in their later adulthood.

Summary of Mediation Analyses

The seventh and final research question, and the main purpose of this study, was to determine whether perceptions of students' self-efficacy and their intrinsic motivation in basketball would mediate the relationship between the students' perceptions of their physical education climate and their subsequent physical activity. The results of the mediation analysis utilizing Baron and Kenny's (1986) method resulted in no support for mediation. Although the regression model in step 3 was statistically significant and intrinsic motivation emerged as a major predictor of physical activity, the remaining perceived physical education climate variables beta weights did not approach zero or result in being statistically significantly reduced when entered into the equation with the two mediators. Therefore, no mediation could be concluded from the mediational analysis.

Although there was no indication of even partial mediation based on Baron and Kenny's (1986) mediational analysis, it is worth noting that when regressed in combination with the physical education climate variables intrinsic motivation was found to have a statistically significant direct relationship with physical activity, whereas self-efficacy was not found to be statistically directly related to physical activity. This may be due to the fact that both mediators were highly correlated ($r = 0.79$, $p < .01$) with one another causing self-efficacy to have a diminished relationship with physical activity in the regression model. However, this finding does suggest that perceived intrinsic motivation still optimizes students' physical activity when controlling for the perceived physical education climate variables. This finding strongly encourages physical educators

to provide their students with choices in games and activities that they enjoy to promote greater physical activity (Cury et al., 2002; Kavussanu & Roberts, 1996; Papaioannou et al., 2007).

In addition to perceived intrinsic motivation emerging as a direct positive predictor of physical activity, a teacher's emphasis on perceived mastery goals, social approval goals, and a perceived caring climate were all also found to be directly related to physical activity. Both perceived mastery and caring climate had inverse relationships with physical activity, whereas perceived social approval had a positive direct relationship with physical activity. Overall, the direct relationships between the statistically significant physical education climate variables (i.e., mastery, social approval, and caring climate) and physical activity remained nearly the same with the exception of perceived mastery when the two proposed mediators were combined into the equation.

Overall, the findings of utilizing Baron and Kenny's (1986) mediational analysis led to rejecting the final hypothesis in the study that self-efficacy and intrinsic motivation mediated the relationship between the physical education climate and physical activity. However, the direct relationships evident in step 3 of the analysis did further strengthen that intrinsic motivation plays an important role in predicting greater physical activity. A teacher's emphasis on mastery goals was found to negatively predict physical activity along with a perceived caring climate. This once again reiterates the point made earlier that within this sample physical educators who created an environment perceived by students' as being supportive and attentive and a class climate that focuses on gaining

competence in an activity actually results in fewer steps. Again, this finding is contrary to previous research that has linked a perceived caring climate to greater future participation in physical activity programming (Newton, Watson, Gano-Overway et al. 2007) and a teacher's emphasis on mastery goals being linked to greater intrinsic motivation (Papaioannou et al., 2007), that has been directly linked to antecedents of physical activity (Cury et al., 2002; Kavussanu & Roberts, 1996). However, a teacher's emphasis on social approval goals or emphasizing effort in front of their peers does seem to lead to greater physical activity.

The findings with regard to the path analysis and the proposed model was not a good overall fit according to the following indices, {χ^2 (125.59, 2) = 251.17, $p < 0.001$, CFI = 0.66, TLI = -5.11, and RMSEA = 0.67 (90% CI = 0.61 - 0.75)}. The chi-square was found to be significant that indicated an inadequate model. Additional fit-indices also proved to produce an inadequate fit model. In particular, the CFI (0.66), TLI (-5.11), and RMSEA (0.67) all indicated an inadequate model. Overall, the model was revealed inadequate and a poor fit. Based on the moderate direct relationships found between self-efficacy and intrinsic motivation individually to physical activity in the regression models, perhaps a model predicting a direct effect to physical activity from self-efficacy and intrinsic motivation individually would be more prudent for future research.

The potential explanations of a poor fit model could be due to statistical issues or simply a theoretical or conceptual issue. One statistical issue could be related to the required cutoff points on fit indices possible had a possible ceiling effect among the measures due to lower sample size and/or marginal variance among variables (Hu &

Bentler, 1999). Another explanation may be that there could be another dynamic occurring in physical education settings that may be affecting these interrelationships, such as teaching style, teacher expectations, or the characteristics of the curriculum could have influenced the overall fit of the model. This study also only had four physical educators with two schools that made the data very homogenous regarding students' perceptions of the physical education climate, self-efficacy, and intrinsic motivation. In addition, the basketball task or the implementation of the lesson plan may have been confounding variables not allowing for persistence and effort to emerge through their steps-per-minute. Lastly, perhaps a simpler more direct model from self-efficacy and intrinsic motivation to physical activity would result in a better overall fit model in future research.

Limitations and Methodological Issues

The results of this study should be taken with caution due to the following limitations present in the study. The study was limited to junior high school physical education students located within the Southwest region of the United States that limits the generalizability of the results beyond this sample. In addition, the sample was not representative of the true population (e.g., ethnicity, age, experience level, religious affiliation, and overall interest level for physical education) with the majority of the sample being Caucasian. Variation may have existed in the preferred activities of the participants.

The second major limitation of this study involved numerous measurement issues. For instance, the participants were selected through convenience sampling. Although valid and reliable measures were used in this study most of the data (e.g., questionnaires) were voluntary self-reported responses and the students may have not answered truthfully. In addition, the teacher's emphasis on goals scale was the first time it was employed in the United States and there could have been some translation or cross-cultural issues in the scale. In addition, although the students used the entire range of scores on the individual questionnaire scales the data were heavily skewed and lacked great variability that may have attenuated the correlations among the variables. This study also involved a prospective design that involved two separate measurement periods with a time lag of approximately 1 month and perhaps more time was needed between Time 1 and Time 2 to obtain greater significance in the hypothesized relationships. Additional procedural issues could be relative to the basketball task itself. Basketball being a team sport could have affected the results of the relationships and their overall physical activity levels. The lesson also did not specify the type of warm-up (e.g., static or dynamic stretching) to be employed in each school that led to a significant reduction in the total sample size in the study. The physical educators or the students could have behaved differently due to the researcher's presence. Additionally, the researcher assisted the physical educators in transitioning from one phase of the lesson to the next to ensure uniformity within the lessons across classes, schools, and days but there may have been some uncontrolled timing issues. In addition, each phase of the lesson (e.g., warm-up) could have differed slightly from school to school, period to period, and across gender.

The researcher was present for all of the lessons and instructed the students on the proper placement of the pedometers and the proper behavior while wearing the pedometers but they may not have always complied. Unknowingly to the researchers, the students may have become competitive with the pedometers and shook the pedometers. The pedometers may have been dropped or turned off for an extended period of time unbeknownst to the researchers. In addition, the participants were asked to report their own step counts from the pedometer to their folder that could have led to uncontrollable error. The gym spaces between the schools were not the same dimensions with one school being larger than the other; that could have influenced students' steps-per-minute.

Future Research Directions

Having noted the limitations within the study, several recommendations can be made for future research related to exploring similar relationships examined in this study. Due to the direct moderate relationships found in this study, future research should focus on a more simplified model incorporating both self-efficacy and intrinsic motivation as directly predicting physical activity. Another strategy would be to only incorporate one of the two mediators (self-efficacy and intrinsic motivation) or a combination of the two mediators as a single combined mediator between the perceived physical education climate and physical activity. Perhaps other plausible mediators may be more appropriate between the perceived physical education climate and physical activity such as fitness level, attitudes, or knowledge of game. Conceivably by examining additional psychological climate predictors (e.g., peer, teacher, or parental influence), future

research may produce a model that explains greater variance in combination with physical activity. In addition, prospective research designs are useful for researchers with time constraints but future research would benefit from a longer period than 1 month between Time 1 and Time 2, perhaps to allow for sufficient time for the psychological climate to not only develop but also influence the students' self-efficacy and intrinsic motivation and subsequent students' physical activity.

A second recommendation for future research in this area is to do a pilot study on all of the measures to ensure scale reliability and validity. In addition, using pedometers as an objective method to assess physical activity is useful with limited time and a modest research budget but future researchers should be mindful of the numerous limitations (see previous section) that come with pedometers. A possible suggestion, if there is greater flexibility in the financial budget, would be using accelerometers that could offer fewer procedural limitations (e.g., shaking) and provide even more valuable physical activity data overall (e.g., assess intensity and duration of physical activity bouts).

A third recommendation to future studies would be to control the overall lesson plan even more to ensure more valid and reliable step counts. For example, half of the participants in the original study were removed from the final analyses due to variation between schools and their warm-up methods (e.g., static vs. dynamic stretching). In addition, perhaps individual games or activities may be more prudent to promote and allow for greater overall physical activity.

A fourth recommendation would be to obtain greater variability in the student responses by sampling a greater number of schools with a greater number of teachers with greater cultural diversity and teaching styles to ensure a normal data distribution among variables and avoid violating statistical assumptions of the tests (e.g., normality). In addition, although significant relationships did emerge between perceived performance-avoidance and perceived self-efficacy and intrinsic motivation, perhaps future research would minimize the problem with subject variability by examining a teacher's emphasis on both performance goals in combination. Overall, the limited and peculiar research findings in this study point to a greater need for qualitative research or at least a mixed methods approach to further explore the role the class climate plays in physical education in promoting physical activity in physical education. Further, a qualitative or mixed methods design may be able to ascertain a greater proportion of the approximate 90% remaining variance unaccounted for in students' physical activity.

Conclusion

Prior to the start of the study, further research was needed to better understand the continued decline in physical activity rates amongst youth. This research study sought to better understand this problem by examining the motivational processes that may influence adolescent active participation in physical education. Specifically, a sample of junior high school physical education students answered questionnaires related to their perceptions of self-efficacy and intrinsic motivation towards basketball to better

understand the mediational role of these two variables between their perceptions of the physical education climate and their subsequent physical activity via pedometers.

Mediational analyses indicated intrinsic motivation and self-efficacy were not mediators between the perceived physical education climate and physical activity. In addition, the model that was proposed to help clarify the mediational roles of self-efficacy and intrinsic motivation was found to be inadequate. However, a teacher's emphasis on perceived performance-avoidance goals did emerge as a negative predictor of both perceived self-efficacy and intrinsic motivation. This finding indicated that students who perceived the class climate as emphasizing competition that was based on comparisons tended to respond with diminished self-efficacy and intrinsic motivation in basketball. In relation to predicting physical activity, a teacher's emphasis on perceived social approval goals was a positive predictor, whereas a perceived caring climate was a negative predictor.

These important findings indicate that students may prefer activities that provide more social interactions and that a student who perceived being cared for in class at least initially may lead to diminished physical activity. In other words, caring climates may take more time to build relationships between the teachers and the students or even students to students and initially may lead to reduced levels of physical activity. Overall, many answers still remain unclear as to the motivational influences at play in the physical education climate that may influence or improve a student's self-efficacy and intrinsic motivation in specific sports or activities. Overall, the findings suggest that high levels of

self-efficacy and intrinsic motivation optimize physical activity but the best predictors of these two variables and physical activity still require further research.

APPENDIX A

BASKETBALL LESSON PLAN (30 MINUTES)

Title: Basketball Lesson; *Grade Level:* 7-9; Equipment (1 basketball per student)
Psychomotor Objective: Students will successfully demonstrate a basketball dribble (dribble should be waist level). Also, students will be able to demonstrate a proper shot in a free throw (e.g. eyes on target; shooting elbow in, at right angle and shoot with one hand; hips square to the target; back straight; and knees bent).
Cognitive Objective: Students will be able to describe the proper dribbling technique and shooting technique.
Affective Objective: Students will maintain eye contact with instructor when instructions are given, demonstrate good sportsmanship, and help with equipment distribution and retrieval.
Warm-up: (5 minutes) Pedometers on!!!! Teachers will use basketballs for a warm-up activity to begin practicing dribbling skills.
Instruction and Skill Drills: (10 minutes) *Activity:* Dribbling (5 minutes); Goal is that students will be able to identify and use specific basketball skills with a focus on dribbling a basketball. *Activity:* Free throw shooting (5 minutes); Goal is that students will be able to identify the proper technique of shooting a free-throw.
Game Play: (15 minutes) 3 on 3 Basketball or 5 on 5 Basketball depending on class size
Purpose of Activity: To combine the skills taught in the previous activities during a real game.
Prerequisites: Split the class into teams of 3 with different color jerseys for each team and provide one hoop for two teams with one basketball per hoop.
Game play directions: One team starts with the ball and is attacking the basket, with the other team defending. If the defenders get the ball then the roles are reversed. The object of the game is to score more points than your opponents. Each game will be played for 5 minutes in duration. At the sound of the whistle the losing teams will remain in the same court while the winning teams will rotate clockwise around to the nearest hoop. Then repeat 2 times.
In closing: Return the pedometers to the researchers without opening the pedometers! Reinforcement of skills learned and what will take place the next day in class.

APPENDIX B

ASSENT TO PARTICIPATE IN A STUDY

Purpose of the Research

We are asking you to take part in a research study because we want to find out how you feel about learning and playing basketball in your physical education (PE) class. We also want to know if your feelings make you more or less active when playing basketball in your PE class.

Procedures

If you agree to participate in this study it will take no more than 10 PE class periods to complete this study. As part of this study you will be asked questions about yourself (e.g., age and gender) and your PE class. In particular, you will be asked questions about how you feel about learning and playing basketball in your PE class and if those feelings make you more or less active while playing basketball in your PE class. It will take you no more than 20 minutes to complete the questionnaire packet on two separate times (once in the beginning of the semester and once toward the end of the semester).

Additionally, you will be asked to wear a pedometer (step-counter) from the start of class until the end of class on 8 separate days, which will involve 4 separate days in the start of the semester and 4 separate days at the end of the semester. Lastly, on the fifth day, you will be offered an opportunity to participate in a free-play day in which you will be permitted to choose from a variety of basketball activities or you can choose to not participate for the entire class period.

Risks

The risks of this study are minimal. You may feel upset thinking about or talking about personal information related to PE. These risks are similar to those experienced when you are discussing personal information with others. If you feel upset from this experience, you can tell the researcher, and he/she will tell you about resources available to help.

Benefits

You may benefit in this study by finding out how active you are in your PE class through a pedometer (step-counter). Being in this study will also help us to understand why some youth value physical activity and why others do not. There will be no direct benefits to your participation in this research study.

Alternative Procedures and Voluntary Participation

If you don't want to be in this study, you don't have to be in it. Remember, being in this study is up to you and no one will be upset if you don't want to participate. You can change your mind later if you want to stop. We will also ask you to bring home a parent information letter and if your parent/guardian does not want you to participate in this study, he/she can contact me.

Confidentiality

All of your records about this research study will be kept locked up so no one else can see them. We will keep the records in a locked office. In addition, your PE teacher will not be

able to read or see the questionnaires that are completed and will not know how you answered the questions.

Person to Contact

You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call me (Fitni Destani, 801- 581-7558) or ask me next time.

Consent

Signing my name at the bottom means that I agree to be in this study. My parents and I will be given a copy of this form after I have signed it.

Printed Name of Child	
Signature of Child	Date
Printed Name of Witness	
Signature of Witness	Date

APPENDIX C

PARENT INFORMATION LETTER

Relationships Between the Physical Education Climate and Physical Activity in Junior High School Physical Education: A Mediational Analysis of Self-efficacy and Intrinsic Motivation

Hello, my name is Fitni Destani and I am a graduate student at the University of Utah. With the permission of the Davis County School District (see attached) and the University of Utah, I am conducting a research study in the junior high schools. Your child is being asked to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you will allow your child to take part in this study.

The purpose of this research study is to examine if your child's view of their capabilities and interest in basketball influence the relationship between your child's view of their physical education environment and their subsequent physical activity. It is hypothesized that children who have high views of their capabilities and interest in basketball will have a positive influence in the relationship between their views of a physical education environment and subsequent physical activity.

It will take your child approximately 10 physical education classes to complete this study. As part of this study your child will be asked to wear one pedometer (Yamax SW-200) on the waistband for 8 regularly scheduled physical education classes, meanwhile your child will spend about twenty minutes completing one short questionnaire designed to assess his/her feelings toward physical education or motivation toward physical education at the start of two classes, once in the beginning of the semester and once toward the end of the semester. Participation in this study is voluntary. Your child can choose not to take part. Your child can choose not to finish the questionnaire or omit any question he or she prefers not to answer without penalty or loss of benefits.

Your child's data will be kept confidential. Data and records will be stored in a locked filing cabinet or on a password protected computer located in my office. Only the members of this study team and I will have access to this information.

If you have any questions or complaints or if you feel your child may have been harmed as a result of participation, please contact Fitni Destani, Department of Exercise and Sport Science at 801-581-7558 or cell phone (415) 407-2419. If you do not your child to participate, please contact either of these two numbers to contact me.

Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

APPENDIX D

FEELINGS TOWARD PE AND BASKETBALL QUESTIONNAIRE

Thank you for agreeing to share information with us, regarding your experiences in physical education. The information you provide will be used to understand how students think and feel while involved in basketball in physical education class.

There are no right or wrong answers. What is important is that you answer how you truly feel. Please be as honest as you can while answering to each item. Thank you very much for your cooperation.

Part I. Background Information

Name of your school: _____

Name of your PE teacher: _____

What grade are you in? _____

What is your Age: _____ Circle which Sex: male or female

What is your Race/ethnicity:

- How long have you been taught by your current PE teacher? _____ year(s)
- How long have you played basketball? _____ year(s)
- Do you play basketball for a competitive team after school? _____ If yes, how long _____ year(s)
- When you get to high school, you will have a choice whether you want to take physical education. How much would you want to take it? (**Circle one number**)

1 2 3 4 5
(Not at all) (Moderately) (Very Much)

Part II. How do you feel about your teacher?
Direction: Please read the phrase in the box that begins with "**My PE teacher"** Then read each of the following statements and indicate how much you personally agree with each statement by circling the response (i.e., from strongly agree (5) to strongly disagree (1)) which best expresses your feeling. There are no right or wrong answers. Please answer how you really feel.

My PE teacher:

	Strongly Disagree	Disagree	Don't agree or Disagree	Agree	Strongly Agree
1. He/she often makes me worried if they say I'm not good in PE.----------	1	2	3	4	5
2. His/her point for me in PE is to learn skills and games so my classmates like me.----------	1	2	3	4	5
3. He/she encourages some students to play better than others.----------	1	2	3	4	5
4. He/she makes me afraid of being evaluated in PE, so I protect myself from it.----------	1	2	3	4	5
5. He/she is happy about what I learn in PE, so that other people like me.----------	1	2	3	4	5
6. He/she is absolutely satisfied only with students that everyone recognizes as better in PE.----------	1	2	3	4	5
7. He/she often makes me worry about how others see my athletic abilities.----------	1	2	3	4	5
8. He/she is very satisfied when I try to learn a PE skill, so that other people like me.----------	1	2	3	4	5

My PE teacher:

	Strongly Disagree	Disagree	Don't agree or Disagree	Agree	Strongly Agree
9. He/she insists that we must try hard to prove that we are better in PE skills and games than others.----------	1	2	3	4	5
10. He/she makes me avoid questions in the lesson that may lead to others laughing at me.----	1	2	3	4	5
11. He/she believes it's important to do well on a PE skill or game, so that other people like me.----	1	2	3	4	5
12. He/she is very happy when I learn new PE skills and games.----------	1	2	3	4	5
13. He/she often makes me worry if he/she says I am not good in PE drills or games.----------	1	2	3	4	5
14. He/she pays particular attention to whether my PE skills are improving.----------	1	2	3	4	5
15. He/she only praises students that look like they are better than others in PE.----------	1	2	3	4	5
16. He/she wants me to learn new PE skills and games, so that others like me.----------	1	2	3	4	5

My PE teacher:

	Strongly Disagree	Disagree	Don't agree or Disagree	Agree	Strongly Agree
17. He/she is absolutely satisfied when he/she sees that I improve all my physical abilities.-----	1	2	3	4	5
18. His/her point in PE is that students should prove that they are better than others in all skills and games.----------	1	2	3	4	5
19. He/she feels great when I learn a new PE skill, so that my classmates like me.----------	1	2	3	4	5
20. He/she helps me learn how to improve my abilities in PE games and exercises.----------	1	2	3	4	5
21. He/she wants us to look better than others in all PE exercises.----------	1	2	3	4	5
22. He/she makes me avoid PE exercises or games that could lead to me having negative feelings about my abilities.----------	1	2	3	4	5
23. He/she insists that errors in PE skills and games help me find my weaknesses and improve my abilities.----------	1	2	3	4	5
24. He/she makes sure that I understand how to do a new skill before the class moves on to learning other skills.----------	1	2	3	4	5

Part III. How do you feel about your PE teacher?
Directions: Please read the phrase in the box that begins with "**In my PE class"** Then read each of the following statements and indicate how much you personally agree with each statement by circling the response (i.e., from strongly agree (5) to strongly disagree (1)) which best expresses your feeling. There are no right or wrong answers. Please answer how you really feel.

In my PE class:

	Strongly Disagree	Disagree	Don't agree or Disagree	Agree	Strongly Agree
1. Kids are treated with respect. ----------	1	2	3	4	5
2. My PE teacher respects kids.----------	1	2	3	4	5
3. My PE teacher is kind to kids.----------	1	2	3	4	5
4. My PE teacher cares about kids.----------	1	2	3	4	5
5. Kids feel that they are treated fairly.----------	1	2	3	4	5
6. My PE teacher tries to help kids.----------	1	2	3	4	5
7. My PE teacher wants to get to know all the kids.-	1	2	3	4	5
8. Everyone likes kids for who they are.----------	1	2	3	4	5
9. My PE teacher listens to kids.----------	1	2	3	4	5
10. My PE teacher accepts kids for who they are.-	1	2	3	4	5
11. Kids feel safe.----------	1	2	3	4	5
12. Kids feel comfortable.----------	1	2	3	4	5
13. Kids feel welcomed every day.----------	1	2	3	4	5

Part IV. How do you feel about your capabilities in basketball?
Directions: Please read the phrase in the box that begins by saying "**With regard to this week's basketball activity, I have confidence in"** Then read each of the following statements and indicate how much you personally agree with each statement by circling the response (i.e., from strongly agree (5) to strongly disagree (1)) which best expresses your feeling. There are no right or wrong answers. Please answer how you really feel.

With regard to this week's basketball activity, I have confidence in…

	Strongly Disagree	Disagree	Don't agree or Disagree	Agree	Strongly Agree
1. My ability to doing well in basketball.-------	1	2	3	4	5
2. My ability to learn skills well in basketball.--	1	2	3	4	5
3. My performance in basketball.----------	1	2	3	4	5
4. My knowledge needed to do well in basketball.----------	1	2	3	4	5
5. My success in basketball if I exert enough effort.----------	1	2	3	4	5
6. My ability to handle the nervous feelings related to basketball.----------	1	2	3	4	5

Part V. How do you feel about basketball?

Directions: Please read each of the following statements and indicate how much you personally agree with each statement by circling the response (i.e., from very true (5) to somewhat true (3) and not at all true (1)) which best expresses your feeling. There are no right or wrong answers. Please answer how you really feel.

For each of the statements, **indicate** how true it is for you, using the following scale:

1	2	3	4	5	6	7
not at all true			**somewhat true**			**very true**

1. I enjoy basketball very much. _____

2. Basketball is fun to do._____

3. I think basketball is a boring activity._____

4. Basketball does not hold my attention at all._____

5. I would describe basketball as very interesting._____

6. I think basketball is quite enjoyable._____

7. While playing basketball, I am thinking about how much I enjoy it._____

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